INSTRUCTION MANUAL

OPERATION & SERVICE

PORTABLE VENTILATOR

Uni-Vent™, 700 SERIES, MODEL 750/750M

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IMPACT INSTRUMENTATION, INC.

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NOTE: This section is provided standard on all U.S. Department of Defense procurements. It is available at additional cost to qualified commercial accounts.

The SERVICE section Table of Contents and List of Illustrations can be found on on pages II - i, and II - ii.

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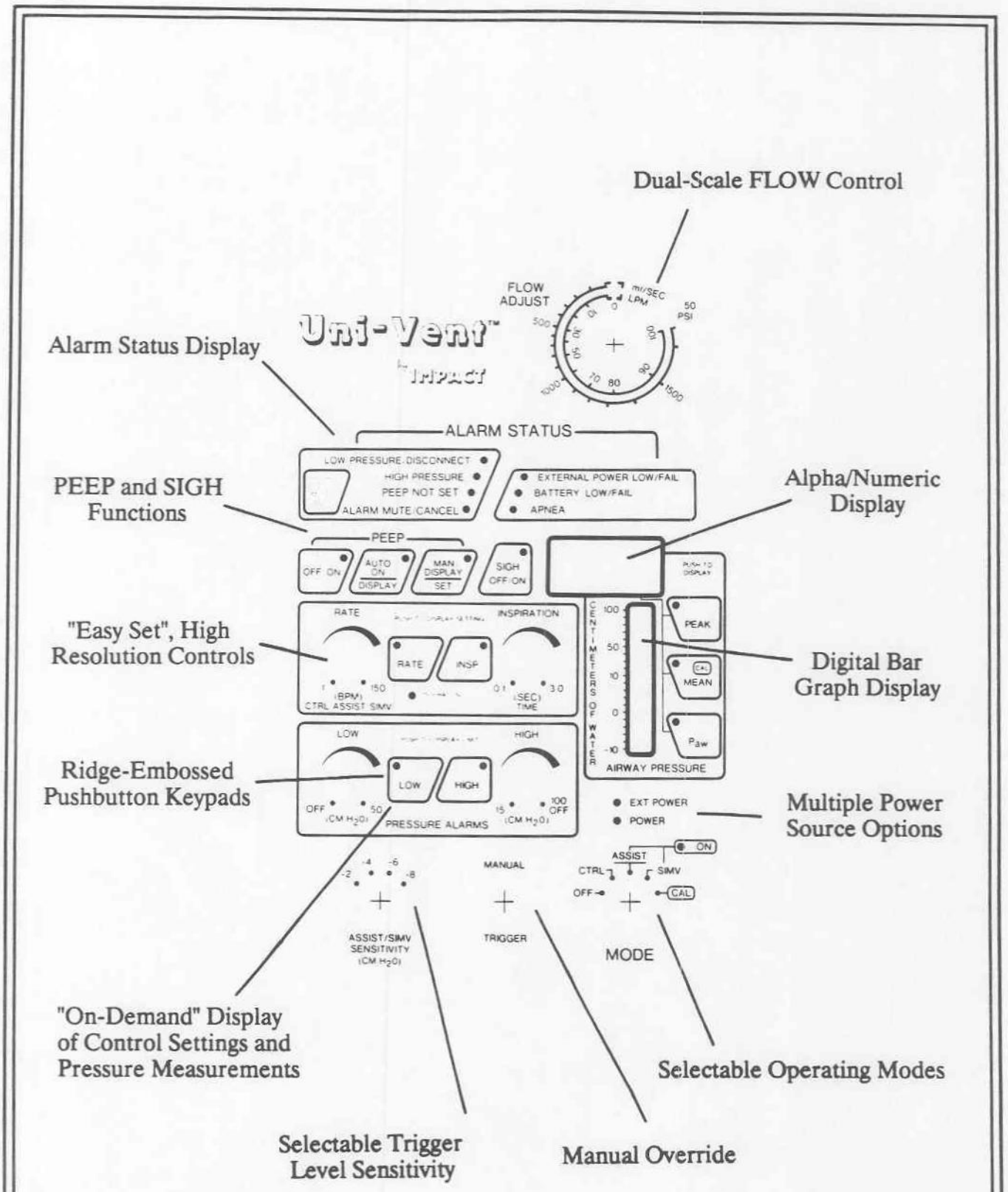


Figure 1. Model 750/750M Main Features

SHIPPING CONTENTS

Each Uni-Vent™ Model 750 is shipped with the following components:

1 ea. Control Module (with battery pack installed)
2 ea. Patient Valve
1 ea. High Pressure Hose, 6' Long (connects between gas source and Control Module)
1 ea. Spiral Hose, 10mm I.D. (connects between Control Module and Patient Valve)
1 ea. Hose, 1/8" I.D. (connects between Control Module "TRANSDUCER" and Patient Valve)
1 ea. Hose, 3/16" I.D. (connects between Control Module "DEMAND VALVE" and Patient Valve). This hose is supplied only when optional Demand Valve is ordered.
1 ea. Multivoltage AC Power Supply
1 ea. 12 VDC Power Cable
1 ea. Instruction Manual, Operation, Model 750

Each Uni-Vent™ Model 750M is shipped with the following components:

1 ea. Control Module
1 ea. Patient Valve
1 ea. High Pressure Hose, 6' Long (connects between gas source and Control Module)
1 ea. Spiral Hose, 10mm I.D. (connects between Control Module and Patient Valve)
1 ea. Hose, 1/8" I.D. (connects between Control Module "TRANSDUCER" and Patient Valve)
1 ea. Hose, 3/16" I.D. (connects between Control Module "DEMAND VALVE" and Patient Valve)
1 ea. Multivoltage AC Power Supply
1 ea. 12 VDC Power Cable with Military Connector (per Fed. Spec. KKK-A-1822A, B, C)
1 ea. Battery Pack (normally installed in Control Module at time of shipment unless contract requires uninstalled battery pack)
2 ea. * Instruction Manual, Operation & Service, Model 750/750M

* Available to Department of Defense users only.

ACCESSORIES LIST

The Accessories List contains common items, required from time to time. Each item is preceded by its part number. Accessories may be ordered direct from Impact. When ordering, please include the part number, description and quantity required.

Send written purchase orders to: Impact Instrumentation, Inc.
P.O. Box 508
West Caldwell, New Jersey 07006

Telephonic orders: 201/882-1212

Fax orders: 201/882-4993

Part Number	Description
701-0750-03	Patient Valve Assembly
820-0043-00	Optional PEEP Valve, Adjustable 0-20 cmH_2O, (disposable, single patient use)
825-0002-00	High Pressure Hose, 6' Long
540-0076-00	Spiral Hose, 10mm I.D., Patient, Autoclavable
540-0081-00	Spiral Hose, 10mm I.D., Patient, Single Patient Use
540-0075-00	Hose, 3/16" I.D., Demand Valve, Autoclavable
540-0080-00	Hose, 3/16" I.D., Demand Valve, Single Patient Use

ACCESSORIES LIST, (cont'd)

Part Number	Description
540-0073-00	Hose, 1/8" I.D., Transducer, Autoclavable
540-0078-00	Hose, 1/8" I.D., Transducer, Single Patient Use
334-0032-00	Hose Clips (5/Package)
704-0750-07	Wall Mounting Bracket Assembly
704-0750-08	Pole Mounting Bracket Assembly
704-0750-09	Rail Mounting Bracket Assembly
701-0750-02	Multivoltage AC Power Supply
708-0001-00	12 VDC Power Cable
708-0302-01	12 VDC Power Cable with Military Connector (Model 750M)
800-0751-01	Blender, Air/Oxygen
906-0750-01	Instruction Manual, Operation (Model 750)
906-0750-02	Instruction Manual, Operation & Service (Model 750/750M)

LIMITED COPYRIGHT RELEASE (Model 750M)

Permission is hereby granted to the Department of Defense to reproduce all material furnished under this contract for use in a military service training program and other technical training programs.

CALIBRATION NOTICE

This device should be incorporated into a regular preventative maintenance program to insure compliance with operating specifications. Calibration measurements should be made each year unless significant usage warrants a shorter period between preventative maintenance inspections. A calibration check should be made following each cumulative period of 1000 hours of operation (recommended maintenance checks can be found in the SERVICE section of the Model 750M Instruction Manual).

UNPACKING

Compare the contents of the shipping case(s) against the SHIPPING CONTENTS list. Examine the instrument for any obvious signs of shipping damage. If there is no apparent sign of mechanical damage, read the instructions contained within this Manual before attempting to operate the instrument.

LOCATION OF USE

Uni-Vent™ is a transportable device, therefore, its location of use will vary. When operated in a wet environment, user's should take precautions and protect this device by covering it with a protective barrier (small tarp, plastic sheet, etc.).

WARNINGS REGARDING USE

This device is intended for use by qualified medical personnel or person(s) under the guidance and instruction of a physician.

CAUTION - Electric shock hazard, do not remove equipment covers.

DANGER - Possible explosion hazard if used in the presence of flammable anesthetics.

WARNINGS REGARDING USE, (cont'd)

DO NOT operate this instrument prior to reading the instructions contained within this Manual.

Service is to be performed by qualified biomedical equipment technicians only, (for Model 750M, see section entitled **SERVICE**).

CAUTION - Do not allow oil and grease to enter the system. **See ROUTINE CARE AND MAINTENANCE** section entitled **CLEANING** for additional instructions.

NOTE - FLOW ADJUST Control numerals are calibrated to a 50 PSI input driving pressure. If driving pressure does not equal 50 PSI, actual gas flow may deviate from the stated FLOW ADJUST Control setting. Confirm delivery of desired gas volume by measuring exhaled tidal volume.

ASSEMBLY, INTERCONNECTIONS AND INITIAL ADJUSTMENTS

ASSEMBLY:

Model 750 - No assembly is required before placing this device into operation.

Model 750M - Depending upon contract requirements, internal battery packs may be shipped apart from the Control Module. For battery pack installation instructions see the **BATTERY CARE AND RECHARGING** section.

INTERCONNECTIONS:

CAUTION - the following interconnection instructions must be followed prior to placing this device into service (see Figure 2).

1. Connect the high pressure hose between the Control Module GAS INlet PORT and the external gas source.

2. Connect the 10mm spiral hose between the Control Module GAS OUT PORT and the Patient Valve GAS INlet PORT.

3. Connect the 1/8" I.D. hose between the Control Module TRANSDUCER fitting and the Patient Valve PATIENT INTERFACE TRANSDUCER port.

4. Connect the 3/16" I.D. hose between the Control Module DEMAND VALVE fitting and the Patient Valve PATIENT INTERFACE DEMAND VALVE port.

5. If operation from an external power source is desired, connect the Multivoltage AC Power Supply or 12 VDC Power Cable between the Control Module EXTERNAL POWER JACK and the external power source.

NOTE: The Multivoltage AC Power Supply is preset for nominal 115 VAC/50- 400 Hz operation. It contains a selector switch which may be repositioned if nominal 230 VAC/50-400 Hz operation is required. The Multivoltage AC Power Supply is also provided with input leads for 11-30 VAC/VDC operation/recharge. A mating connector is required to attach these leads to their respective 11-30 VAC/VDC source. Input polarity does not matter.

ASSEMBLY, INTERCONNECTIONS AND INITIAL ADJUSTMENTS, (cont'd)

INITIAL ADJUSTMENTS:

Before placing this device into operation read the section entitled **OPERATION, DESCRIPTION OF CONTROLS, INDICATORS AND CONNECTIONS**. Make control settings and verify device performance prior to interfacing with patient.

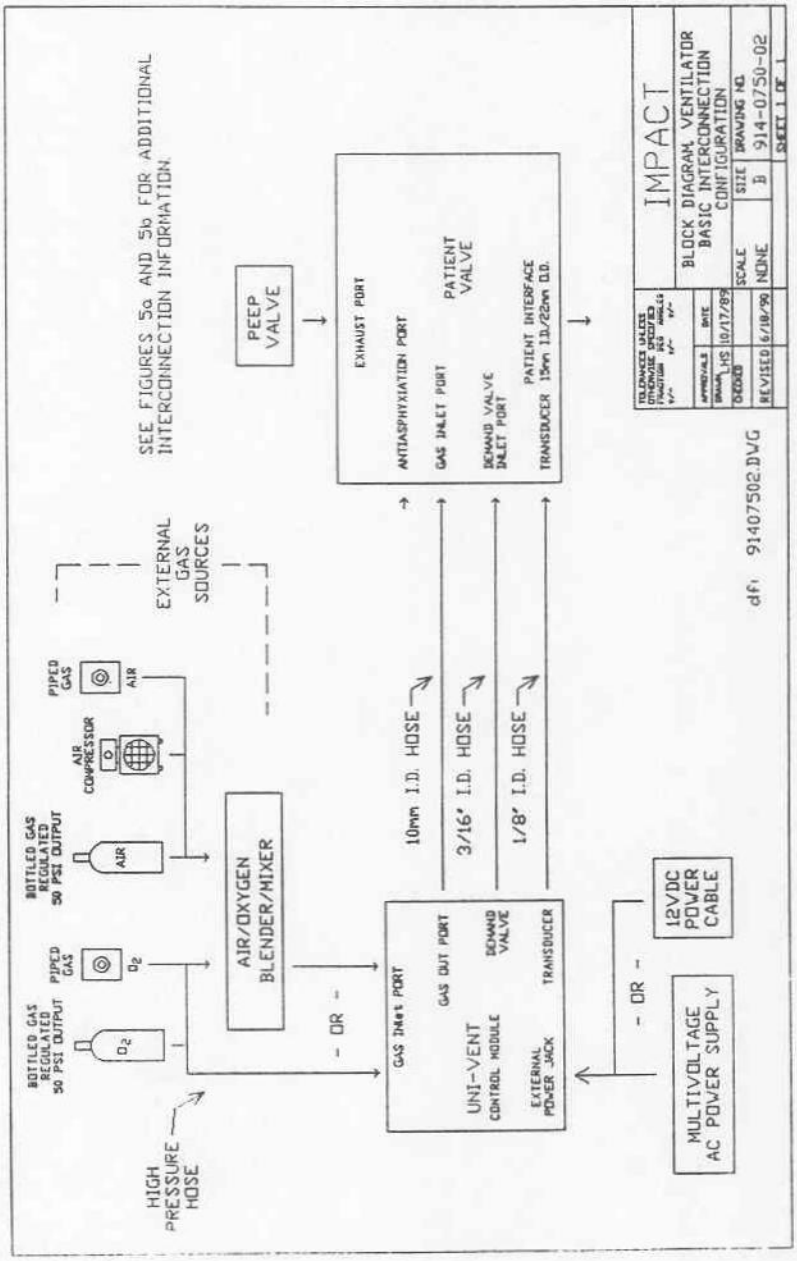


Figure 2. Interconnection Diagram

OPERATION

INTRODUCTION

Uni-Vent™ is a portable, electronically controlled, time-cycled, pressure limited ventilator. It is controlled by an on-board microprocessor which continuously monitors the patient's airway pressure, all control settings, alarm parameters and power signals. Inspiration pressures can be limited by setting an adjustable pressure limit control. Uni-Vent™ provides ventilatory support in CONTROL, ASSIST-CONTROL and SYNCHRONIZED INTERMITTENT MANDATORY VENTILATION (SIMV) modes. During ASSIST-CONTROL and SIMV operation, Uni-Vent™ will automatically revert to a special ASSIST-CONTROL mode if the patient becomes apneic. Each mode is operable with or without SIGH.

Uni-Vent™ is operable from internal, rechargeable batteries; or external 12 VDC. A 115/230 VAC, 11-30 VAC/VDC, (50-400 Hz) Multivoltage AC Power Supply and 12 VDC Power Cable are provided with each device. Uni-Vent™ does not consume gas for operating power.

The microprocessor monitoring circuit is coupled to a comprehensive alarm system. Alarms include: internal and external power (low or failure), low airway pressure, patient disconnect, high airway pressure and PEEP Not Set. Each of these alarms can be muted for a predetermined period and will automatically reactivate if the reason-for-alarm continues. A new alarm condition overrides any "muted" pre-existing alarm. Each alarm automatically self-cancels when its causing condition no longer exists. A self-cancelled alarm will not cause other existing alarm(s) to be cancelled. Additional alarms include: apnea, memory check failure, self-check failure, transducer calibration, transducer calibration aborted, extended high pressure (FAL) and inverse I/E ratio.

Uni-Vent™ is extremely durable and designed for all environments. The Control Module case is formed from flame-retardant, acrylic reinforced PVC. Its autoclavable Patient Valve is injection molded from flame retardant, clear, polysulfone and carries a UL94 V-2 rating.

Uni-Vent™ delivers gas from a multitude of sources: compressed gas cylinder (oxygen or air or blended combination), electric compressor (oil-less and filtered), PTLOX, or on-board aircraft generated source. Acceptable input gas pressures to the Control Module may range up to 100 PSI, however, FLOW ADJUST Control labelling is based on a 50 PSI input (see **WARNINGS REGARDING USE**).

This ventilator is appropriate for use in clinical, field hospital, aeromedical, homecare, and prehospital (ALS, ATLS, ACLS) settings. Its small size and weight facilitates transport, deployment and storage.

Uni-Vent™ is ideal for emergency/trauma use. CONTROL MODE features provide consistent ventilation, selectable over a broad range. Settings can be custom tailored to meet each patients ventilatory needs.

The ASSIST-CONTROL MODE permits patient-controlled assisted ventilations. Each assisted ventilation occurs when a patient initiated breath reaches a preset negative pressure threshold setting (referenced to end pressure). Uni-Vent™ will generate controlled ventilations should the patients' spontaneous breathing rate fall below its ventilation rate setting. Assisted and/or controlled ventilations conform to Uni-Vent™'s inspiratory time and flow settings.

INTRODUCTION, (cont'd)

The Synchronized Intermittent Mandatory Ventilation (SIMV) mode permits patients to breathe spontaneously while periodically receiving MANDATORY ventilations (synchronized or nonsynchronized) from Uni-Vent™. Ambient air may be entrained through Uni-Vent™'s Patient Valve ANTIASPHYXIATION PORT, or optional Demand Valve connection. The spontaneously breathing patient is allowed to entrain breathing gas through the ANTIASPHYXIATION PORT, or optional Demand Valve, at his/her own rate/inspiratory time. Uni-Vent™ is configured to deliver MANDATORY breaths as determined by its ventilation rate, inspiratory time, flow and trigger threshold settings. MANDATORY breaths that occur within Uni-Vent™'s timing window are synchronized to the patients ventilatory effort.

Should the patient become apneic in the ASSIST-CONTROL or SIMV modes, Uni-Vent™ will activate its APNEA Alarm and automatically invoke ASSIST-CONTROL ventilations at the ventilation rate/inspiratory time/flow rate settings or 12 ventilations per minute/inspiratory time/flow rate settings - whichever is greater.

Positive End Expiratory Pressure (PEEP) may be used in all modes of operation. Uni-Vent™'s Patient Valve Exhalation Port is configured to accept most adjustable and fixed value PEEP valves. Uni-Vent™ can automatically monitor and display PEEP pressure. Should the patients' exhalation pressure signal deteriorate and become unacceptable to Uni-Vent™'s PEEP monitoring program, a PEEP NOT SET alarm will sound. Users may choose to operate without PEEP at this time or manually program Uni-Vent™ to a specific PEEP reference without PEEP alarm capability.

FEATURES

- Microprocessor control of all functions including automatic monitoring of internal battery and external power sources.
- Alarm monitoring of airway pressure, disconnect, apnea and power sources.
- Contemporary design to facilitate transport and placement.
- Electronic control circuitry to eliminate all pneumatic-logic circuits and dependency on gas for operating power.
- Rechargeable batteries, fully compatible with vehicular electrical systems and airborne environments. Standard battery provides approximately 9-hours of continuous operation, optional battery provides in excess of 11-hours.
- Operates continuously from external 11 to 30 volt power sources (AC or DC), positive or negative ground, 50-400 Hz.

OPERATION

DESCRIPTION OF CONTROLS, INDICATORS AND CONNECTIONS

CONTROL MODULE

CONTROLS

Uni-Vent™'s Control Module contains various controls, indicators and connectors. Each is described in the following text (see Figure 3).

CONTROL MODULE: CONTROLS, INDICATORS AND CONNECTIONS, (cont'd)

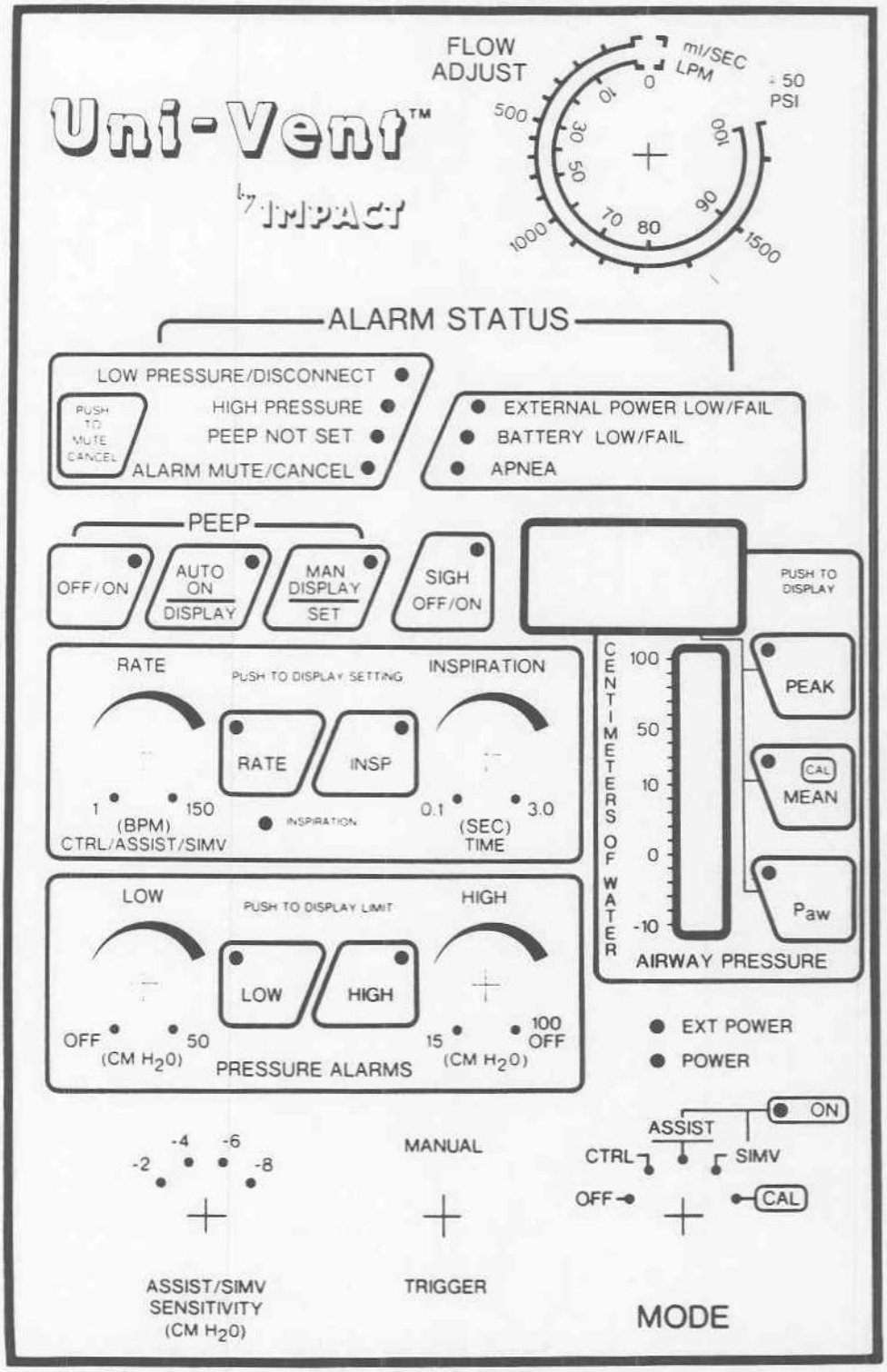


Figure 3. Control Module

CONTROL MODULE: CONTROLS, INDICATORS AND CONNECTIONS, (cont'd)

FLOW ADJUST: The FLOW ADJUST Control may be used with 100% oxygen, medical- grade air or blended mixtures of oxygen and air - depending upon the circumstances of use. This control is calibrated in two scales: liters per minute (LPM) and milliliters per second (ml/SEC). Users may quickly calculate deliverable tidal volume by multiplying the FLOW ADJUST Control setting (using the ml/SEC scale) by the INSPIRATORY TIME Control setting (in seconds, or fractions of seconds).

- Example: Flow Adjust Control is set to 1000ml/SEC and the Inspiratory Time Control is set to 0.5 SEC. Therefore, deliverable volume equals 1000 X 0.5 = 500ml

Specific applications may require the use of "blended" combinations of air and oxygen to achieve oxygen concentrations between 21% and 100%. Standard gas blenders may be used for this purpose. Their blended output may be connected directly to Uni-Vent^{TM}'s gas inlet fitting (see **Interconnection Diagram, Figure 2**). Uni-Vent^{TM}'s FLOW ADJUST Control setting will determine flow rate of the blended gas mixture. Uni-Vent^{TM}'s maximum flow rate is approximately 100 LPM @50 PSI.

NOTE - FLOW ADJUST Control numerals are calibrated to a 50 PSI input driving pressure. If driving pressure does not equal 50 PSI, actual gas flow may deviate from the stated FLOW ADJUST Control setting. Confirm delivery of desired gas volume by measuring exhaled tidal volume.

MODE SELECTOR SWITCH:

OFF-CTRL-ASSIST-SIMV-CAL: The MODE SELECTOR SWITCH provides operating power in the CONTROL, ASSIST-CONTROL, SIMV or CAL positions.

Turning the MODE SELECTOR SWITCH to CTRL, ASSIST or SIMV, causes the microprocessor to perform a "SELF-CHECK" (see section entitled **SELF-CHECK**). During "SELF-CHECK" the microprocessor sequentially displays the current settings for RATE, INSPIRATION TIME, LOW PRESSURE ALARM, HIGH PRESSURE ALARM, and SENSITIVITY. Calibration of the airway pressure transducer is permitted in the CAL position only (see section entitled **TRANSDUCER CALIBRATION**).

RATE Control: The RATE control is used to select a ventilation rate during CONTROL, ASSIST-CONTROL and SIMV (Synchronized Intermittent Mandatory Ventilation) operation.

During CONTROL MODE operation, Uni-Vent^{TM} cycles in accordance with its RATE, INSPIRATION TIME and FLOW ADJUST settings. (See section entitled CONTROL MODE VENTILATION).

In the ASSIST-CONTROL MODE, Uni-Vent^{TM} is configured to deliver a set rate and inspiration time as in CONTROL MODE. Patient-initiated breaths, sensed by negative pressure deflection, causes Uni-Vent^{TM} to deliver an "assisted" ventilation at its FLOW and INSPIRATION TIME settings. Controlled ventilations are delivered when there are no spontaneous respirations or the patients' spontaneous breathing rate falls below Uni-Vent^{TM}'s ventilation RATE setting. Controlled ventilations are delivered at the RATE, INSPIRATION TIME and FLOW ADJUST settings. (See section entitled **AUGMENTED VENTILATION**).

In the SIMV MODE, Uni-Vent^{TM} will intermittently deliver a controlled breath, at the RATE Control setting and synchronized to the patients spontaneous respiration. The patient normally breaths at his/her own spontaneous rate and volume, but when it becomes time for the controlled breath to be delivered, it is synchronized with the patients next inspiration. (See section entitled **AUGMENTED VENTILATION**).

CONTROL MODULE: CONTROLS, INDICATORS AND CONNECTIONS, (cont'd)

RATE Display Pushbutton Switch: Activates the ALPHA/NUMERIC DISPLAY to show the RATE Control setting.

INSPIRATION TIME Control: The INSPIRATION TIME Control sets the inspiratory duration of all ventilator-delivered breaths. It is adjustable in 0.1 second increments from 0.1 to 3.0 seconds maximum. Its range is limited by the RATE Control setting. Inverse I:E Ratio's (inspiratory time is greater than expiratory time) is not permitted. (See section entitled **ALARMS**).

INSPIRATION TIME Display Pushbutton Switch: Activates the ALPHA/NUMERIC DISPLAY to show the INSPIRATION TIME Control setting.

LOW PRESSURE ALARM Control: This control is used to select the LOW PRESSURE ALARM activation point. It has an absolute range from OFF to 50 cmH_2O.

LOW PRESSURE ALARM Display Pushbutton Switch: Activates the ALPHA/NUMERIC DISPLAY to show the LOW PRESSURE ALARM Control setting.

HIGH PRESSURE ALARM Control: This control is used to select the HIGH PRESSURE ALARM activation point and peak inspiratory pressure relief mechanism. It has an absolute range from 15 to 100 cmH_2O.

HIGH PRESSURE ALARM Display Pushbutton Switch: Activates the ALPHA/NUMERIC DISPLAY to show the HIGH PRESSURE ALARM Control setting.

ASSIST/SIMV SENSITIVITY Switch: This control sets the ASSIST/SIMV activation (triggering) threshold. Its setting determines how much negative deflection a spontaneously breathing patient must generate before Uni-Vent™ delivers an assisted ventilation. The ASSIST/SIMV SENSITIVITY Control has a range of -2 to -8 cmH_2O below end expiratory pressure.

MANUAL TRIGGER Pushbutton Switch: The MANUAL TRIGGER Pushbutton overrides automatic operation. When activated, it permits gas flow at the set continuous flow rate and functions in all operating modes. During CPU failure, the MANUAL TRIGGER serves as a backup means to provide manually triggered ventilations if an electronics malfunction occurs in the primary system. When the MANUAL TRIGGER Pushbutton Switch is released, resynchronization occurs by allowing a full exhalation period to occur before timed breaths resume. The MANUAL TRIGGER Pushbutton is protected against accidental contact by a circular guard. **NOTE:** MANUAL TRIGGER operation is designed to bypass the peak inspiratory pressure relief mechanism and close the EXHALATION VALVE.

SIGH OFF/ON Pushbutton Switch: The SIGH OFF/ON Pushbutton Switch permits operation with or without SIGH. When activated, a SIGH ventilation is initiated then repeats once every 100 ventilations or 7-minutes, thereafter, whichever occurs first. Each SIGH ventilation equals 150% of the INSPIRATION TIME setting, which increases delivered volume by 50%. As a safety precaution, Uni-Vent™ will automatically truncate SIGH to a combined maximum of 3-seconds.

CONTROL MODULE: CONTROLS, INDICATORS AND CONNECTIONS, (cont'd)

PEEP OFF/ON Pushbutton Switch: The PEEP OFF/ON Pushbutton Switch provides a means of converting Uni-Vent™'s sensitivity control pressure reference from atmospheric pressure to atmospheric pressure plus PEEP pressure. (See section entitled **USING POSITIVE END EXPIRATORY PRESSURE**).

PEEP AUTO ON/DISPLAY Pushbutton Switch: When PEEP OFF/ON is activated, Uni- Vent™ defaults to PEEP "AUTO ON", permitting automatic monitoring of PEEP. Depressing this switch activates the ALPHA/NUMERIC DISPLAY to show the current PEEP pressure. Depressing this switch during MANual PEEP operation returns Uni-Vent™ to AUTOmatic PEEP. (See section entitled **USING POSITIVE END EXPIRATORY PRESSURE**).

PEEP MANual DISPLAY/SET Pushbutton Switch: The PEEP MANual DISPLAY/SET Pushbutton Switch allows a PEEP reference to be manually entered. In this mode, Uni-Vent™ does not track PEEP. (See section entitled **USING POSITIVE END EXPIRATORY PRESSURE**).

PEAK AIRWAY PRESSURE Display Pushbutton Switch: Instructs the microprocessor to display the peak pressure, of the most recent respiration, in the ALPHA/NUMERIC DISPLAY.

MEAN AIRWAY PRESSURE Display Pushbutton Switch: Instructs the microprocessor to display the MEAN AIRWAY PRESSURE in the ALPHA/NUMERIC DISPLAY. Uni-Vent™ stores mean airway pressure data in 5-buffers, each buffer contains data pertinent to one of the most recent five respirations. Buffers are referred to as 0 thru 4, with 0 representing the most recent respiration. The inspiratory time duration determines how Uni-Vent™ calculates MEAN AIRWAY PRESSURE and is described as follows:

- If the inspiratory period is less than 1-second, Uni-Vent™ calculates: $\frac{(\text{buffers } 0 + 1)}{2}$

- If the inspiratory period is greater than 1-second, but less than 2.5 seconds, Uni-Vent™ calculates: $\frac{\frac{(\text{buffers } 0 + 1 + 2 + 3)}{4} + (\text{buffer } 4)}{2}$

- If the inspiratory period is greater than 2.5 seconds, Uni-Vent™ calculates: $\frac{(\text{buffers } 0 + 1 + 2 + 3 + 4)}{5}$

P_{aw} Display Switch: Instructs the microprocessor to display the current airway pressure (P_{aw}) in the ALPHA/NUMERIC DISPLAY. The numerical value of P_{aw} will scroll upwards and downwards as the pressure signal changes.

ALARM MUTE/CANCEL Pushbutton Switch:

Muting: Depressing this switch mutes the audible alarm condition for a predetermined period (see **ALARM FUNCTIONS**). Alarm muting is reset when the current alarm condition no longer applies or

CONTROL MODULE: CONTROLS, INDICATORS AND CONNECTIONS, (cont'd)

ALARM MUTE/CANCEL Pushbutton Switch (cont'd)

the predetermined mute-period is reached (audible alarm will resound). A new alarm condition overrides any "muted" pre-existing alarm.

Cancelling: The ALARM MUTE/CANCEL Pushbutton Switch operates differently in the presence of Apnea. When depressed, it cancels the audible and visual APNEA alarms and the special ASSIST-CONTROL mode which is automatically invoked at the onset of apnea. Cancellation of the Apnea alarm allows Uni-Vent™ to resume operation at the current ASSIST-CONTROL or SIMV settings.

INDICATORS

NOTE: When activated, STATUS, DISPLAYS and ALARM INDICATORS are either momentary (M) or continuously (C) illuminating.

STATUS

RATE Display Lamp (M): Illuminates when the RATE Display Pushbutton Switch is depressed or when the RATE Control setting is adjusted.

INSPIRATION TIME Display Lamp (M): Illuminates when the INSPIRATION TIME Display Pushbutton Switch is depressed or the INSPIRATION TIME Control setting is adjusted.

INSPIRATION Indicator Lamp (M): Illuminates during the inspiratory cycle, of all ventilator-generated breaths, in all operating modes.

LOW PRESSURE ALARM Display Lamp (M): Illuminates when the airway LOW PRESSURE ALARM Display Pushbutton Switch is depressed or the LOW PRESSURE ALARM Control setting is adjusted.

HIGH PRESSURE ALARM Display Lamp (M): Illuminates when the airway HIGH PRESSURE ALARM Display Pushbutton Switch is depressed or the HIGH PRESSURE ALARM Control setting is adjusted.

ASSIST/SIMV ON Indicator Lamp (C): Illuminates when ASSIST-CONTROL or SIMV operation is selected. The ASSIST/SIMV ON LAMP will not illuminate during APNEA.

SIGH OFF/ON Indicator Lamp (C): This indicator lamp toggles between OFF and ON each time the SIGH OFF/ON Pushbutton Switch is depressed.

CONTROL MODULE: CONTROLS, INDICATORS AND CONNECTIONS, (cont'd)

PEEP OFF/ON Indicator Lamp (C): This indicator lamp toggles between OFF and ON each time the PEEP OFF/ON Pushbutton Switch is depressed.

PEEP AUTO ON/DISPLAY Indicator Lamp (C): Illuminates when the PEEP AUTO ON/DISPLAY Pushbutton Switch is depressed.

PEEP MANual DISPLAY/SET Indicator Lamp (C): Illuminates when the PEEP MANual DISPLAY/SET Pushbutton Switch is depressed.

PEAK AIRWAY PRESSURE Display Lamp (M): Illuminates when the PEAK AIRWAY PRESSURE Display Pushbutton Switch is depressed.

MEAN AIRWAY PRESSURE Display Lamp (M): Illuminates when the MEAN AIRWAY PRESSURE Display Pushbutton Switch is depressed.

P_{aw} AIRWAY PRESSURE Display Lamp (M): Illuminates when the P_{aw} AIRWAY PRESSURE Display Pushbutton Switch is depressed.

EXTernal POWER Indicator Lamp (C): Illuminates when the Control Module is connected to an active, external power source (see section entitled **OPERATING POWER SELECTION & STOPPING**).

POWER Indicator Lamp (C): Illuminates when the MODE SELECTOR SWITCH is in any position except OFF and the microprocessor validates the available power sources during the power check portion of SELF-CHECK (see **SELF-CHECK**).

DISPLAYS

ALPHA/NUMERIC DISPLAY Lamps (M)(C): The ALPHA/NUMERIC DISPLAY Lamps illuminate automatically during SELF-CHECK when the MODE SELECTOR SWITCH is set to any position except OFF; when adjustment settings are being made for RATE, INSPIRATION TIME or the LOW and HIGH PRESSURE ALARMS, and during certain alarm conditions. It is manually activated when the respective RATE, INSPIRATION TIME, LOW and HIGH PRESSURE Alarm Display Pushbutton Switches; the PEAK, MEAN and P_{aw} AIRWAY PRESSURE Display Pushbutton Switches; or the PEEP AUTO DISPLAY, PEEP MAN DISPLAY, or PEEP MAN SET Pushbutton Switches are depressed.

When activated, the ALPHA/NUMERIC DISPLAY will normally illuminate for three (3) seconds, then blank, to conserve battery power. However, it, will illuminate continuously (without blanking), or blink, under various alarm conditions (see section entitled **ALARM FUNCTIONS**).

CONTROL MODULE: CONTROLS, INDICATORS AND CONNECTIONS, (cont'd)

DIGITAL BAR GRAPH (C): The DIGITAL BAR GRAPH provides continuous display of airway pressure. When a disconnect occurs, the DIGITAL BAR GRAPH Lamp which corresponds to a reading between 0 and 2 cmH_2O will stay illuminated.

ALARMS

BATTERY LOW/FAIL Alarm Lamp (C): Illuminates upon sensing a low battery condition (11 VDC) or battery shorted.

EXTERNAL POWER LOW/FAIL Alarm Lamp (C): Illuminates upon sensing external power source failure or interruption.

LOW PRESSURE/DISCONNECT Alarm Lamp (C): Illuminates when the LOW PRESSURE ALARM activation threshold has been met or when disconnect occurs in the patient circuit.

HIGH PRESSURE Alarm Lamp (C): Illuminates when the HIGH PRESSURE ALARM activation threshold has been met.

APNEA Alarm Lamp (C): The Apnea alarm is operable only in the ASSIST-CONTROL and SIMV modes. Illumination occurs when no combination of positive and/or negative deflections within a predetermined monitoring period (see **ALARM FUNCTIONS**).

PEEP NOT SET Alarm Lamp (C): Illuminates when the required PEEP criterion are not met for three consecutive respiratory cycles (see **ALARM FUNCTIONS**).

ALARM MUTE/CANCEL Lamp (C): Illuminates when the ALARM MUTE/CANCEL Pushbutton Switch is depressed during an alarm condition and remains illuminated during the mute/cancel period.

INVERSE I/E ALARM (ALPHA/NUMERIC DISPLAY) (C): The ALPHA/NUMERIC DISPLAY activates when the combined RATE and INSPIRATION TIME Control settings create and inverse I/E ratio condition. When activated, the ALPHA/NUMERIC DISPLAY alternately blanks then flashes "-IE".

MEMORY CHECK ALARM (ALPHA/NUMERIC DISPLAY) (C): The ALPHA/NUMERIC DISPLAY activates when the MEMORY CHECK portion of SELF-CHECK fails. When activated, the ALPHA/NUMERIC DISPLAY will read "FAL".

TRANSDUCER CALIBRATION ALARM (ALPHA/NUMERIC DISPLAY) (C): The ALPHA/NUMERIC DISPLAY activates when the pressure transducer "zero" baseline exceeds +/- 1 cmH_2O. When activated, the ALPHA/NUMERIC DISPLAY alternately flashes "---" and "the current transducer calibration value".

CONTROL MODULE: CONTROLS, INDICATORS AND CONNECTIONS, (cont'd)

TRANSDUCER CALIBRATION ABORT ALARM (ALPHA/NUMERIC DISPLAY) (C): The ALPHA/NUMERIC DISPLAY activates when the TRANSDUCER CALIBRATION is prematurely stopped. When activated, the ALPHA/NUMERIC DISPLAY alternately flashes "---" and "the current transducer calibration value".

FAL Alarm (ALPHA/NUMERIC DISPLAY) (C): Activates the ALPHA/NUMERIC DISPLAY when a RAM or ROM failure occurs during operation or a continuous pressure above 100 cmH_2O is detected in the patient circuit. When activated, "FAL" is displayed in the ALPHA/NUMERIC DISPLAY.

CONNECTIONS

GAS IN: Nominal 50 PSI input, D.I.S.S. oxygen body (male thread). Connects compressed gas cylinder pressure reducer (medical-grade oxygen, medical-grade air or blended combination); electric compressor (oil-less and filtered); PTLOX; or on-board aircraft generated source.

GAS OUT PORT: Low pressure, 10mm male tapered connection. Connects to Patient Valve GAS INLET PORT using 10mm I.D. spiral hose.

TRANSDUCER: Low pressure, 1/8" hose barb. Connects the internal pressure transducer (located in the Control Module) to the Patient Valve PATIENT INTERFACE TRANSDUCER fitting using 1/8" I.D. tubing.

DEMAND VALVE (Optional): Low pressure, 3/16" hose barb. Connects the optional DEMAND VALVE solenoid, located in the Control Module, to the Patient Valve DEMAND VALVE INLET PORT using 3/16" I.D. tubing.

EXTERNAL POWER JACK: External power supply connection. Connects the Control Module to the Multivoltage AC Power Supply or an external DC power source. **CAUTION: DO NOT** connect external power sources rated higher than 30 volts or lower than 11 volts (see **SPECIFICATIONS**).

AUX JACK: The AUX Jack is an expansion connector. It is designed to interface with Impact Portable Ventilator Compressors.

PATIENT VALVE (see Figure 4)

CONNECTIONS:

GAS INLET PORT: Low pressure. Receives gas intended for patient delivery from the Control Module. The GAS INLET PORT is a valved, 18mm male, tapered connection. The 18mm male connection is attached to a removable elbow fitting. The elbow includes a 10mm O.D. taper at one end, and 18mm I.D./22mm O.D. tapers at the other end. The 10mm O.D. taper connects to the Control Module GAS OUT PORT using the 10mm I.D. spiral hose provided. The 18mm I.D. taper is for attachment to the main valve body. The elbow is removable to facilitate cleaning and provide access to the leaf valve.

PATIENT VALVE: CONNECTIONS, (cont'd)

ANTIASPHYXIATION PORT: Permits entrainment of ambient air through a valved, 15mm male, tapered connection.

NOTE: Low ventilator flow rates can be masked during spontaneous breathing due to entrainment of ambient air through the ANTIASPHYXIATION PORT. This can alter FIO_2 accuracy if breathing gas is furnished through an Air/Oxygen Blender. However, the patients work of breathing, to meet inspiratory needs, will be lower. As a general rule, ventilator flow rate settings should be verified for efficacy. Should Uni-Vent™'s ventilatory flow rate be less than the patients inspiratory flow rate, a high pitched whistle, caused by the opening of the ANTIASPHYXIATION PORT leaf valve, will be heard.

EXHAUST PORT: Tapered, 22mm I.D./30mm O.D. fitting with check valve. Accomodates adjustable or fixed value PEEP valve and/or exhaled gas measuring apparatus (see section entitled **USING POSITIVE END EXPIRATORY PRESSURE**).

PATIENT INTERFACE: Consists of combination 15mm I.D./22mm O.D. tapered ports, 1/8" I.D. and 3/16" I.D. Hose Fittings. The 15mm I.D. is designed to fit standard endotracheal and tracheostomy tube connectors. The 22mm O.D. is designed to fit standard resuscitation masks. The 1/8" I.D. hose fitting connects to the Control Module TRANSDUCER port. A 1/8" hose is provided for interconnection. The 3/16" I.D. hose fitting connects to the Control Module DEMAND VALVE port (optional). A 3/16" hose is provided for interconnection (optional).

PATIENT VALVE FUNCTIONAL DESCRIPTION (see Figure 4)

INSPIRATION: Ventilator-generated gas originating at the Control Module enters the Patient Valve at the GAS IN port. The diaphragm valve inflates, occluding the EXHAUST PORT, and causes all gas to flow to the patient. Leaf valve #1 opens during inspiratory cycles and closes during exhalations. Leaf valve #2 is a one-way check valve which prevents the ANTIASPHYXIATION VALVE from staying open to atmosphere. Leaf valve #3 prevents the patient from entraining gas through the EXHAUST PORT during spontaneous respirations.

EXPIRATION: Gas flow terminates at the Control Module and expired gas is allowed to travel from the patient into the Patient Valve at the PATIENT INTERFACE connection. The diaphragm valve deflates, allowing exhaled gas to flow through the EXHAUST PORT while leaf valves 1 & 2 close, insuring that patient-exhaled gas can only flow through the EXHAUST PORT. Exhaled gas vents to atmosphere through leaf valve #3. An external PEEP valve is required for AUTOmatic and MANual PEEP operation. The PEEP valve can be connected directly to the EXHAUST PORT.

PATIENT VALVE, (cont'd)

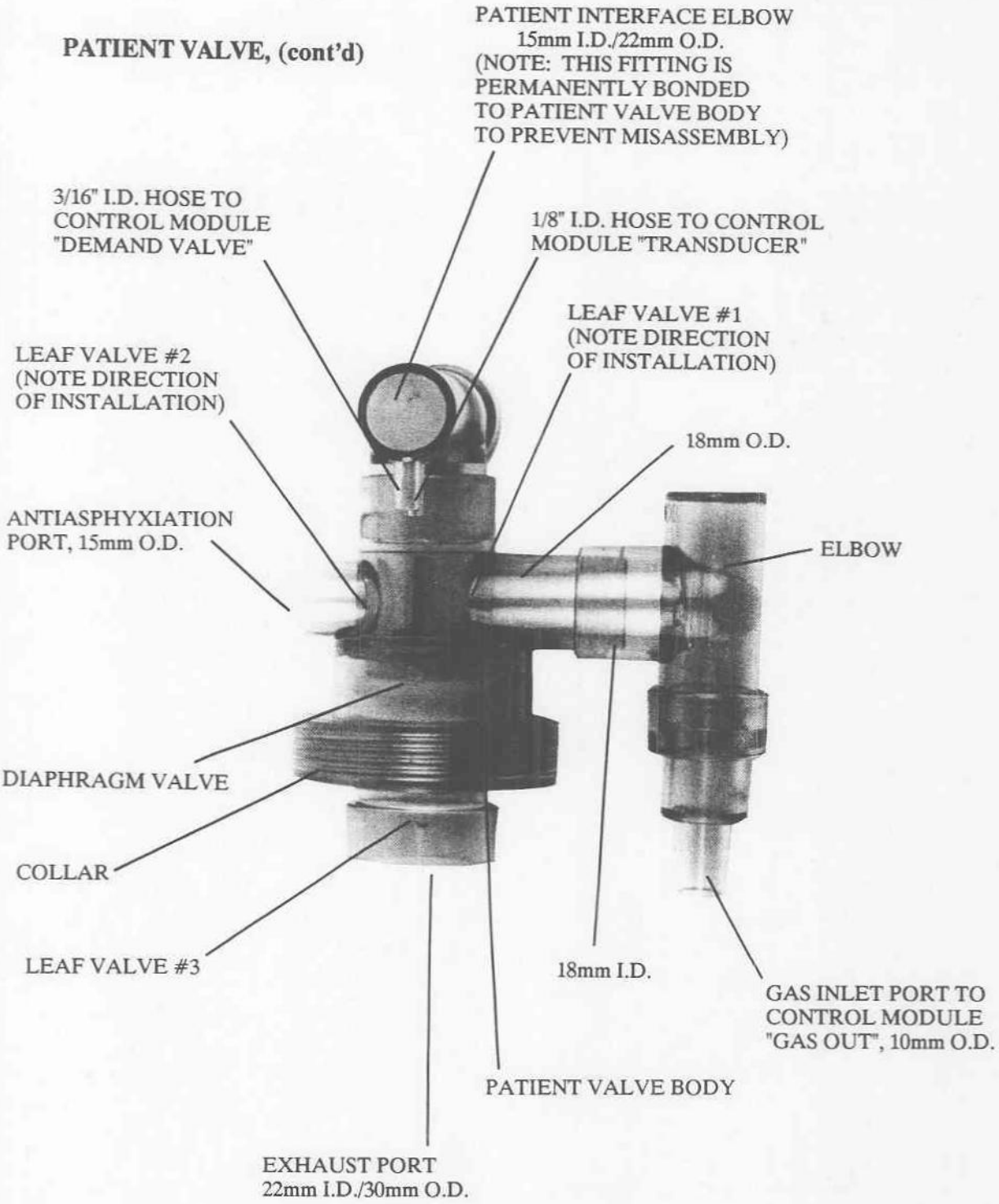

PATIENT INTERFACE ELBOW
15mm I.D./22mm O.D.
(NOTE: THIS FITTING IS PERMANENTLY BONDED TO PATIENT VALVE BODY TO PREVENT MISASSEMBLY)
3/16" I.D. HOSE TO CONTROL MODULE "DEMAND VALVE"
1/8" I.D. HOSE TO CONTROL MODULE "TRANSDUCER"
LEAF VALVE #1 (NOTE DIRECTION OF INSTALLATION)
LEAF VALVE #2 (NOTE DIRECTION OF INSTALLATION)
18mm O.D.
ANTIASPHYXIATION PORT, 15mm O.D.
ELBOW
DIAPHRAGM VALVE
COLLAR
LEAF VALVE #3
18mm I.D.
GAS INLET PORT TO CONTROL MODULE "GAS OUT", 10mm O.D.
PATIENT VALVE BODY
EXHAUST PORT
22mm I.D./30mm O.D.

Figure 4. Patient Valve

OPERATING POWER SELECTION & STOPPING

Uni-Vent™ is designed to operate from various voltages and frequencies (see **SPECIFICATIONS**).

Simultaneous operation and battery recharge from nominal 115 volt, 50-400 Hz; 230 volt, 50-400 Hz AC; 11-30 VAC, 50-400 Hz or 11-30 VDC (Positive or Negative ground) sources require use with the Multivoltage AC Power Supply. The line voltage (AC mains) can be selected by setting the voltage selector switch on the Multivoltage AC Power Supply. A mating connector is required to attach the 11-30 VAC/VDC leads to their respective 11-30 VAC/VDC source. Input polarity does not matter.

External 12 volts DC for simultaneous operation and battery recharge may be connected directly to the Control Module EXTERNAL POWER JACK. A 12 VDC Power Cable is provided for operation from a vehicular source or external 12 volt battery.

The Control Module MODE SELECTOR SWITCH acts as a master power switch to begin or cease operation.

Uni-Vent™ defaults to operation from the external power source (when connected) and simultaneously recharges its batteries. When an external power failure occurs, Uni-Vent™ automatically switches to internal power while activating the EXTERNAL POWER LOW/FAIL Alarm. When external power reappears, operation will again default to the external source and the EXTERNAL POWER LOW/FAIL Alarm will self-cancel.

INITIAL SET-UP, SELF-CHECK & CALIBRATION

INITIAL SET-UP: (see Figures 5a and 5b)

Uni-Vent™ is easily configurable to suit most applications. Additional hoses, fittings and adapters may be required for particular uses. Figures 5a and 5b depict common applications.

- TEST ALL CONFIGURATIONS FOR CORRECT OPERATION PRIOR TO PATIENT CONNECTION.

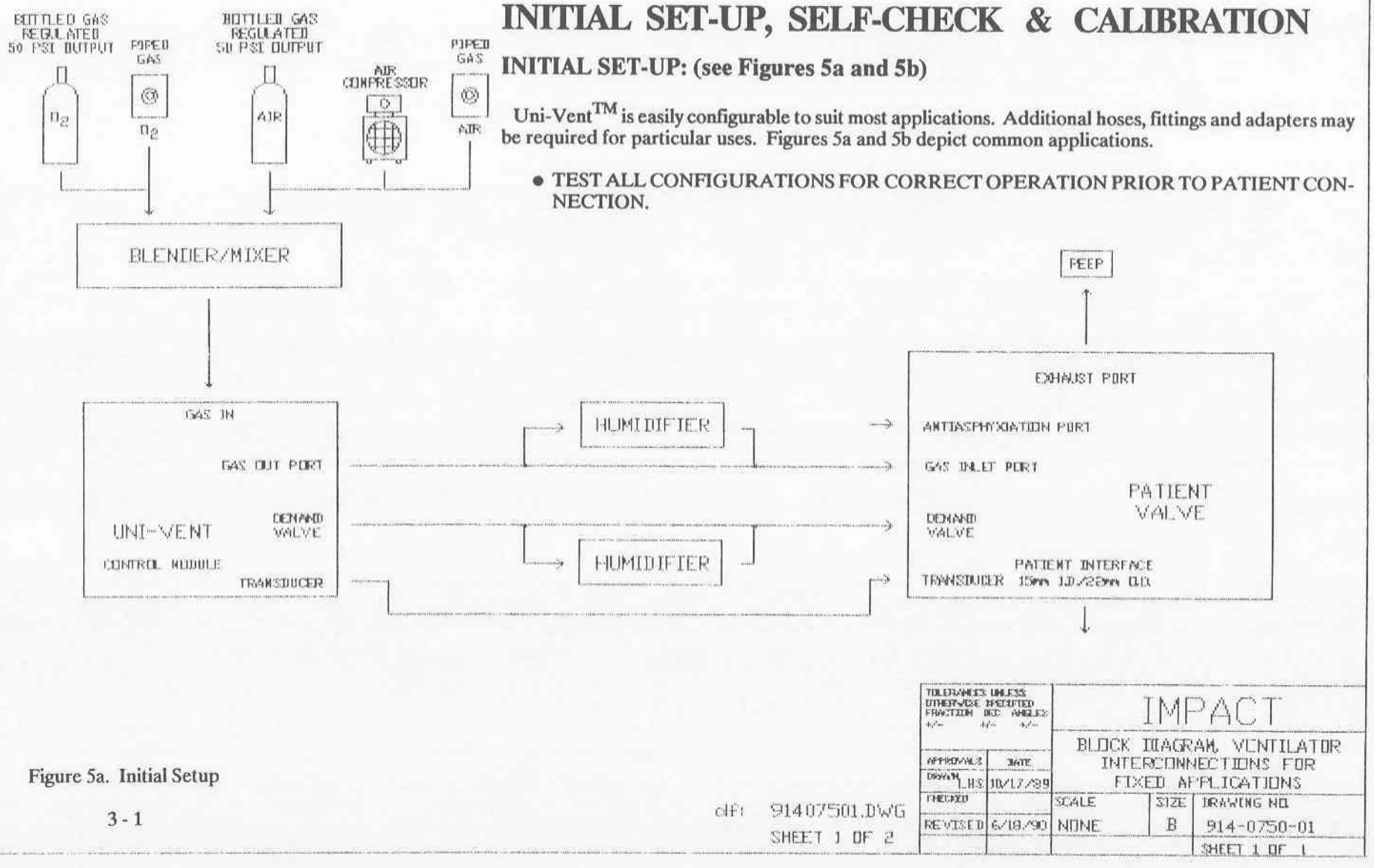
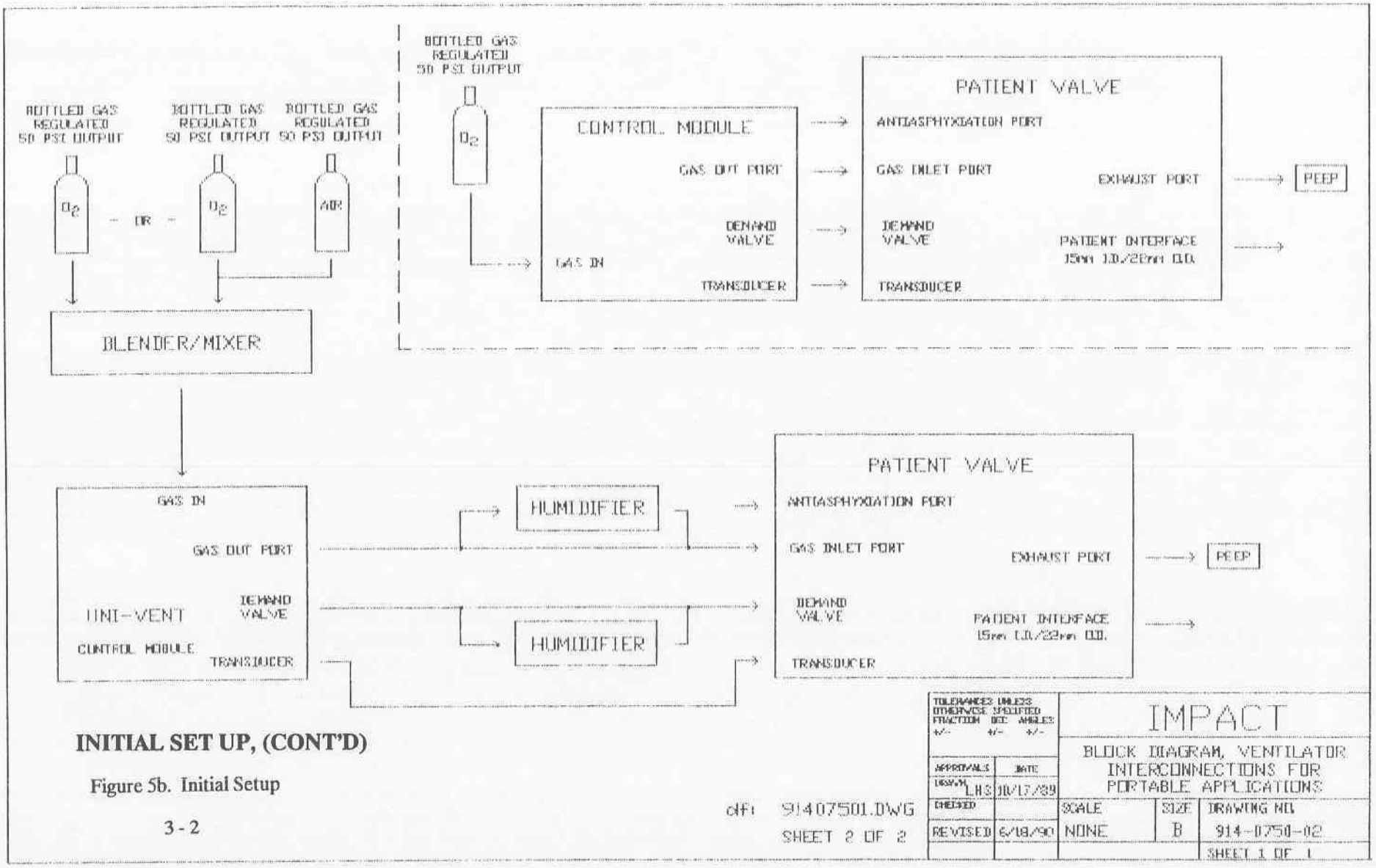


Figure 5a. Initial Setup

TOLERANCES UNLESS OTHERWISE SPECIFIED FRACTION +/- DEC +/- ANGLES +/-		IMPACT	
APPROVALS	DATE	BLOCK DIAGRAM, VENTILATOR INTERCONNECTIONS FOR FIXED APPLICATIONS	
DRAWN LHS	10/17/89		
CHECKED		SCALE	SIZE / DRAWING NO
REVISED	6/18/90	NONE	B / 914-0750-01
			SHEET 1 OF 1

dfr: 91407501.DWG
SHEET 1 OF 2



INITIAL SET UP, (CONT'D)

Figure 5b. Initial Setup

TOLERANCES UNLESS OTHERWISE SPECIFIED FRACTION DEC ANGLES +/- +/- +/-		IMPACT	
APPROVALS	DATE	BLOCK DIAGRAM, VENTILATOR INTERCONNECTIONS FOR PORTABLE APPLICATIONS	
DRAWN LHS	10/17/89		
CHECKED		SCALE	SIZE / DRAWING NO.
REVISED	6/18/90	NONE	B / 914-0750-02
			SHEET 1 OF 1

DWG: 91407501.DWG
SHEET 2 OF 2

INITIAL SET-UP, SELF-CHECK & CALIBRATION, (cont'd)

SELF-CHECK

Uni-Vent™ undergoes a self-checking process when its MODE SELECTOR SWITCH is set to CTRL, ASSIST or SIMV.

The SELF-CHECK process consists of interaction between Uni-Vent™'s microprocessor and peripheral circuitry to verify external power/internal battery status, pressure transducer calibration and front panel control settings. SELF-CHECK begins with Uni-Vent™ checking the external power/internal battery status and internal memory check. It then displays, in order, the current values of:

- 1. Pressure TRANSDUCER CALIBRATION (displays only when pressure transducer calibration is required, see section entitled **TRANSDUCER CALIBRATION**)
- 2. RATE
- 3. INSPIRATION TIME
- 4. LOW PRESSURE ALARM
- 5. HIGH PRESSURE ALARM
- 6. ASSIST/SIMV SENSITIVITY

NOTE: SELF-CHECK MUST BE PERFORMED WITH THE PATIENT VALVE DISCONNECTED FROM THE PATIENT. SELF-CHECK MUST BE ESTABLISHED IN OPEN ATMOSPHERE.

RATE, INSPIRATION TIME, LOW PRESSURE ALARM, HIGH PRESSURE ALARM and ASSIST/SIMV SENSITIVITY settings are sequentially displayed in the ALPHA/NUMERIC DISPLAY for 1-second intervals. Their respective Display Lamps (except ASSIST/SIMV SENSITIVITY) are also illuminated for 1-second intervals.

SELF-CHECK is complete when the ALPHA/NUMERIC DISPLAY blanks. Operation begins immediately following SELF-CHECK.

If Uni-Vent™ fails the MEMORY CHECK portion of its SELF-CHECK, the ALPHA/NUMERIC DISPLAY will continuously display "FAL" and a beeping alarm activates. Turn the MODE SELECTOR SWITCH to its OFF position and then repeat this procedure. If SELF- CHECK fails again, contact qualified service personnel - **DO NOT ATTEMPT PATIENT USE.**

SELF-CHECK will automatically alert attendant personnel if the pressure transducer calibration "zero" baseline exceeds +/- 1 cmH_2O. An audible tone sounds and the ALPHA/NUMERIC DISPLAY alternately flashes "---" and "the current transducer calibration value". If only the pressure transducer calibration portion of SELF-CHECK fails, proceed to the section entitled **TRANSDUCER CALIBRATION - DO NOT ATTEMPT PATIENT USE.**

TRANSDUCER CALIBRATION

Uni-Vent™'s Patient Valve is connected to a pressure-sensing element (transducer) in the Control Module which provides data input to the microprocessor. Transducer calibration information is stored in a serial, non- volatile EEPROM memory. Unless recalibrated, this information can remain in memory for as long as 10-years. Transducer calibration is essential for correct operation.

TRANSDUCER CALIBRATION is recommended prior to each patient use.

INITIAL SET-UP, SELF-CHECK & CALIBRATION, (cont'd)

TRANSDUCER CALIBRATION, (cont'd)

NOTE: Uni-Vent™ must be recalibrated when the ALPHA/NUMERIC DISPLAY reads other than zero (0) during SELF-CHECK.

The TRANSDUCER CALIBRATION process calibrates Uni-Vent™'s transducer to atmospheric pressure. During operation, Uni-Vent™'s microprocessor will respond according to pressure signals from the transducer which are compared to its Control Module Front Panel settings.

TRANSDUCER CALIBRATION MUST BE PERFORMED IN AMBIENT ATMOSPHERE. **DO NOT** *CONNECT PATIENT VALVE TO PATIENT DURING THIS PROCEDURE.*

- 1. Set the MODE SELECTOR SWITCH to CAL. The ALPHA/NUMERIC DISPLAY remains blank and the DIGITAL BAR GRAPH will illuminate one or more of its lamps.
- 2. Depress (and hold down) the MEAN AIRWAY PRESSURE Display Pushbutton Switch for approximately three (3) seconds. A tone will activate during this period and the ALPHA/NUMERIC DISPLAY will blank.
- 3. When the tone ceases, calibration is complete. The ALPHA/NUMERIC DISPLAY will register "00", while the DIGITAL BAR GRAPH Lamp corresponding to a range of 0 to 2 cmH_2O will remain illuminated.

Removing one's finger from the pushbutton, prematurely, aborts the CAL process. A steady tone will be emitted from Uni-Vent™ and the ALPHA/NUMERIC DISPLAY will alternately flash "---" and "the current transducer calibration value". The CAL procedure must be restarted by turning the MODE SELECTOR SWITCH to the OFF position, then returning it to CAL and repeating the process described in steps 1, 2 and 3 above.

IMPORTANT NOTE: Functions which are dependent upon accurate pressure readings should only be used in conjunction with a protected airway. This will prevent "leaks" from distorting the pressure signals. **DO NOT** use pressure dependent functions with an unprotected airway. This applies primarily to use with uncuffed endotracheal tubes and tracheostomy tubes and resuscitation masks where the face-to-mask-seal integrity is frequently and typically compromised.

MODES OF OPERATION

Control Module Front Panel settings may be adjusted at any time. In normal use, adjustments are typically made following SELF-CHECK.

The following operating modes are supported by Uni-Vent™:

- CONTROL VENTILATION - WITH/WITHOUT SIGH - WITH/WITHOUT PEEP
- ASSIST-CONTROL VENTILATION - WITH/WITHOUT SIGH - WITH/WITHOUT PEEP
- SYNCHRONIZED INTERMITTENT MANDATORY VENTILATION (SIMV) - WITH/WITHOUT SIGH - WITH/WITHOUT PEEP
- ASSIST-CONTROL BACKUP DURING APNEA - WITH/WITHOUT SIGH - WITH/WITHOUT PEEP

CONTROL MODE VENTILATION

In CONTROL (CTRL) MODE, the user is concerned with establishing a controlled breathing RATE, INSPIRATION TIME and gas flow. Depending upon application, the gas flow may consist of 100% medical-grade oxygen or medical-grade compressed air, or a blended combination of the two. Users may select operation with or without "SIGH", and set LOW and/or HIGH AIRWAY PRESSURE ALARM settings as well.

The following steps are required to implement CONTROL MODE VENTILATION:

1. Turn MODE SELECTOR SWITCH to the CTRL position. Allow the SELF-CHECK tests to complete. Perform TRANSDUCER CALIBRATION if required (see section entitled **TRANSDUCER CALIBRATION**).

DO NOT connect Patient Valve to patient during SELF-CHECK.

When SELF-CHECK is completed, CONTROL MODE cycling begins automatically. The INSPIRATION Lamp illuminates during the inspiratory portion of each controlled ventilation.

NOTE: When CONTROL MODE cycling begins, the LOW PRESSURE/DISCONNECT ALARM will activate. This alarm will remain active until the Patient Valve is connected to the patient (see Step 4, below) and the pressure transducer detects a pressure rise during the next ventilator generated breath, or the ALARM MUTE/CANCEL Pushbutton Switch is depressed.

2. Adjust the RATE, INSPIRATION TIME, gas FLOW ADJUST, LOW and HIGH AIRWAY PRESSURE ALARM Control settings as required. If LOW and HIGH AIRWAY PRESSURE ALARM's are not used, set their respective controls to "OFF". When the LOW AIRWAY PRESSURE ALARM Control is set to "OFF", DISCONNECT Alarm capability remains. When the HIGH AIRWAY PRESSURE ALARM Control is set to "OFF", a 100 cmH_2O Peak Inspiratory Pressure Relief default remains active.

NOTE: Tidal volume can be quickly calculated by multiplying the FLOW ADJUST Control setting (using the ml/SEC scale) by the INSPIRATION TIME Control setting (in seconds, or fractions of seconds). A FLOW - INSPIRATION TIME - TIDAL VOLUME Chart is attached to Uni-Vent™'s lower cover.

3. Attach Patient Valve to patient's endotracheal or tracheostomy tube.

MODES OF OPERATION, (cont'd)

CONTROLLED VENTILATION, (cont'd)

4. Attach PEEP Valve to Patient Valve and adjust to desired setting. Activate PEEP OFF/ON Push-button Switch. (See **USING POSITIVE END EXPIRATORY PRESSURE** for complete instructions).

NOTE: Excessive flows and/or inspiration times, occlusion of the patient circuit or a change in the patients physiological condition can cause a rise in inspiratory pressure. To safeguard the patient from high inspiratory pressures, Uni-Vent™ employs a protective Peak Inspiratory Pressure Relief system. Selection of a Peak Inspiratory Pressure Relief value corresponds to the HIGH AIRWAY PRESSURE ALARM Control setting. When the HIGH AIRWAY PRESSURE ALARM Control is set to "OFF" a default of 100 cmH_2O is invoked. Airway pressures, in excess of the Peak setting are automatically vented to atmosphere.

5. Activate the SIGH OFF/ON Pushbutton Switch if required. A SIGH ventilation is initiated then repeats once every 100 ventilations or 7-minutes, whichever occurs first. Each SIGH ventilation equals 150% of the INSPIRATION TIME setting, which increases delivered volume by 50%. However, as a safety precaution, Uni-Vent™ will automatically truncate SIGH to a combined maximum of 3-seconds.

AUGMENTED VENTILATON MODES

IMPORTANT NOTE: Functions which are dependent upon accurate pressure readings should only be used in conjunction with a protected airway. This will prevent "leaks" from distorting the pressure signals. **DO NOT** use pressure dependent functions with an unprotected airway. AUGMENTED VENTILATION should only take place with a protected airway.

Uni-Vent™'s ASSIST-CONTROL and SYNCHRONIZED INTERMITTENT MANDATORY VENTILATION (SIMV) Modes are normally used in conjunction with a common gas source or blended gases through an air/oxygen mixer (blender). This permits the patient to receive controlled, assisted and spontaneous ventilations from atmospheres of similar gas content.

NOTE: Low ventilator flow rates can be masked during spontaneous breathing by entrainment of ambient air through the ANTIASPHYXIATION PORT. This can alter FIO_2 accuracy if breathing gas is furnished through an Air/Oxygen Blender. Conversely, patient work of breathing, to meet inspiratory needs, will be lower. As a general rule, ventilator flow rate settings should be verified for efficacy. Should Uni-Vent™'s ventilatory flow rate not meet the patients inspiratory requirements, a high pitched whistle, caused by the opening of the ANTIASPHYXIATION PORT leaf valve, will be heard.

Uni-Vent™'s SIMV synchronizing window works in conjunction with the ASSIST/SIMV SENSITIVITY Switch setting. The "window" is equivalent to 50% of the RATE period (maximum of 8-seconds). The "window" is timed to open 75% into the RATE period and close when either the spontaneous breath is sensed or at 125% of the rate period, whichever occurs first. When 8-second windows occur, each window will open 4-seconds prior to the onset of each rate marker and close 4-seconds after the onset of each rate marker. When the "window" is opened, Uni-Vent™ looks for the next spontaneous breath to reach the ASSIST/SIMV SENSITIVITY Switch setting threshold. If a spontaneous breath is in process when the "window" is opened, the following operation prevails:

1. If the patient's inspiratory pressure has not reached the ASSIST/SIMV SENSITIVITY Switch setting, Uni-Vent™ will "fire" when the threshold is reached.

2. If the patient's inspiratory pressure has exceeded the ASSIST/SIMV SENSITIVITY Control setting, Uni-Vent™ will wait until the next spontaneous inspiration to reach the "firing" threshold.

MODES OF OPERATION, (cont'd)

AUGMENTED VENTILATION, (cont'd)

NOTE: AUGMENTED VENTILATIONS are continuously monitored by Uni-Vent™. Should apnea occur during ASSIST-CONTROL or SIMV operation, Uni-Vent™'s microprocessor will invoke a special ASSIST-CONTROL mode (see **ASSIST-CONTROL VENTILATION DURING APNEA).**

ASSIST-CONTROL VENTILATION

When set to the ASSIST-CONTROL VENTILATION mode, Uni-Vent™ acts to deliver a set rate (as in CONTROL MODE VENTILATION). However, if the patient initiates a breath (sensed by negative pressure deflection), Uni-Vent™ will synchronously deliver a positive pressure breath at the same FLOW and INSPIRATION TIME set on its Control Module Front Panel. If the patient's spontaneous rate falls below Uni-Vent™'s RATE setting, Uni-Vent™ will work as if it were set to CONTROL MODE VENTILATION.

Should the patient become apneic in the ASSIST-CONTROL MODE, Uni-Vent™ will activate its APNEA Alarm and automatically invoke ASSIST-CONTROL ventilations at its RATE/INSPIRATORY TIME/FLOW ADJUST Control settings or 12 ventilations per minute/INSPIRATORY TIME/FLOW ADJUST Control settings - whichever is greater (see section entitled **ASSIST-CONTROL VENTILATIONS DURING APNEA**).

Depending upon application, gas flow may consist of 100% medical-grade oxygen or medical-grade compressed air, or some fractional (blended) combination of the two. The user may select operation with or without "SIGH", and set LOW and/or HIGH AIRWAY PRESSURE ALARM settings as well.

The following steps are required to implement ASSIST-CONTROL VENTILATION:

1. Turn MODE SELECTOR SWITCH to the ASSIST position, the ASSIST/SIMV ON Indicator Lamp will illuminate. Allow SELF-CHECK tests to complete. Perform TRANSDUCER CALIBRATION if required (see section entitled **TRANSDUCER CALIBRATION**).

DO NOT connect Patient Valve to patient during SELF-CHECK.

When SELF-CHECK is completed, ASSIST-CONTROL cycling begins automatically. The INSPIRATION Lamp will illuminate during the inspiratory portion of each assisted or controlled ventilation.

NOTE: When ASSIST-CONTROL cycling begins, the LOW PRESSURE/DISCONNECT ALARM will activate. This alarm will remain active until the Patient Valve is connected to the patient (see Step 4, below) and the pressure transducer detects a pressure rise during the next ventilator generated breath, or the ALARM MUTE/CANCEL Pushbutton Switch is depressed.

2. Adjust the RATE (ASSIST RATE), INSPIRATION TIME, gas FLOW ADJUST, LOW and HIGH AIRWAY PRESSURE ALARM Control settings as required. If LOW and HIGH AIRWAY PRESSURE ALARM's are not used, set their respective controls to "OFF". When the LOW AIRWAY PRESSURE ALARM Control is set to "OFF", DISCONNECT Alarm capability remains. When the HIGH AIRWAY PRESSURE ALARM Control is set to "OFF", a 100 cmH_2O Peak Inspiratory Pressure Relief default remains active.

NOTE: Tidal volume can be quickly calculated by multiplying the FLOW ADJUST Control setting (using the ml/SEC scale) by the INSPIRATION TIME Control setting (in seconds, or fractions of seconds). A FLOW - INSPIRATION TIME - TIDAL VOLUME Chart is attached to Uni-Vent™'s lower cover.

MODES OF OPERATION, (cont'd)

AUGMENTED VENTILATION, (cont'd)

ASSIST-CONTROL VENTILATION, (cont'd)

3. Set desired ASSIST/SIMV SENSITIVITY. The ASSIST/SIMV SENSITIVITY Switch setting determines the trigger point of each assisted breath relative to the patient's inspiratory effort.

4. Attach Patient Valve to patient's endotracheal or tracheostomy tube. The patient's spontaneous breathing should activate Uni-Vent™. If not, readjust the ASSIST/SIMV SENSITIVITY Control for greater triggering sensitivity (less negative pressure deflection). The INSPIRATION Lamp will illuminate only during the inspiratory portion of each assisted or controlled ventilation.

5. Attach PEEP Valve to Patient Valve and adjust to desired setting. Activate PEEP OFF/ON Pushbutton Switch. (See section entitled **USING POSITIVE END EXPIRATORY PRESSURE** for complete instructions).

NOTE: Excessive flows and/or inspiration times, occlusion of the patient circuit or a change in the patients physiological condition can cause a rise in inspiratory pressure. To safeguard the patient from high inspiratory pressures, Uni-Vent™ employs a protective Peak Inspiratory Pressure Relief system. Selection of a Peak Inspiratory Pressure Relief value corresponds to the HIGH AIRWAY PRESSURE ALARM Control setting. When the HIGH AIRWAY PRESSURE ALARM Control is set to "OFF" a default of 100 cmH_2O is invoked. Airway pressures, in excess of the Peak setting are automatically vented to atmosphere.

6. Activate the SIGH OFF/ON Pushbutton Switch if required. A SIGH ventilation is initiated then repeats once every 100 ventilations or 7-minutes, whichever occurs first. Each SIGH ventilation equals 150% of the INSPIRATION TIME setting, which increases delivered volume by 50%. However, as a safety precaution, Uni-Vent™ will automatically truncate SIGH to a combined maximum of 3-seconds.

SYNCHRONIZED INTERMITTENT MANDATORY VENTILATION (SIMV)

The SYNCHRONIZED INTERMITTENT MANDATORY VENTILATION (SIMV) MODE permits patients to breathe on their own while periodically receiving MANDATORY breaths from Uni-Vent™. Uni-Vent™ is configured to deliver these MANDATORY breaths as determined by its RATE (SIMV RATE), INSPIRATION TIME, gas FLOW and ASSIST/SIMV SENSITIVITY Control settings. Depending upon application, spontaneous breathing gas may originate from ambient air (room air); from a continuous flow of gas via an external gas source (flowmeter or blender); or from Uni-Vent™'s optional demand valve mechanism which senses, by negative pressure deflections, the patient's spontaneous effort. Entrainment of ambient air is through Uni-Vent™'s Patient Valve ANTIASPHYXIATION PORT. Gas flow from a continuously flowing source should be connected to the Patient Valve DEMAND VALVE inlet fitting (3/16" I.D.). Gas flow from Uni-Vent™'s optional Demand Valve is routed from the Control Module DEMAND VALVE fitting to the Patient Valve DEMAND VALVE inlet fitting with the 3/16" I.D. hose provided. MANDATORY breaths generated by Uni-Vent™, are controlled ventilations synchronized with the patient's spontaneous effort. When it is time to deliver the MANDATORY breath, Uni-Vent™ allows a window of time so that it may synchronize with the patient's next inspiration. If there is no inspiratory effort during the timing window, the MANDATORY breath is delivered at the end of the window regardless of patient effort. (See Figures 5a and 5b for attachment references).

Should the patient become apneic in the SIMV MODE, Uni-Vent™ will activate its APNEA Alarm and automatically invoke ASSIST-CONTROL ventilations at its RATE/INSPIRATORY TIME/FLOW ADJUST Control settings or 12 ventilations per minute/INSPIRATORY TIME/FLOW ADJUST Control settings - whichever is greater (see **ASSIST-CONTROL VENTILATIONS DURING APNEA**).

MODES OF OPERATION, (cont'd)

AUGMENTED VENTILATION, (cont'd)

SYNCHRONIZED INTERMITTENT MANDATORY VENTILATION, (cont'd)

Depending upon application, gas flow may consist of 100% medical-grade oxygen, medical-grade compressed air, or some fractional combination of the two. The user may select operation with or without "SIGH", and set LOW and/or HIGH AIRWAY PRESSURE ALARM settings as well.

The following steps are required to implement SIMV VENTILATION:

1. Turn MODE SELECTOR SWITCH to the SIMV position, the ASSIST/SIMV ON Indicator Lamp will illuminate. Allow SELF-CHECK tests to complete. Perform TRANSDUCER CALIBRATION if required (see section entitled **TRANSDUCER CALIBRATION**).

DO NOT connect Patient Valve to patient during SELF-CHECK.

When SELF-CHECK is completed, SIMV cycling begins automatically. The INSPIRATION Lamp will illuminate during the inspiratory portion of each MANDATORY breath.

NOTE: When SIMV cycling begins, the LOW PRESSURE/DISCONNECT ALARM will activate. This alarm will remain active until the Patient Valve is connected to the patient (see Step 4, below) and the pressure transducer detects a pressure rise during the next ventilator generated breath, or the ALARM MUTE/CANCEL Pushbutton Switch is depressed.

2. Adjust the RATE (SIMV RATE), INSPIRATION TIME, Gas FLOW ADJUST, LOW and HIGH AIRWAY PRESSURE ALARM Control settings as required. If LOW and HIGH AIRWAY PRESSURE ALARM's are not used, set their respective controls to "OFF". When the LOW AIRWAY PRESSURE ALARM Control is set to "OFF", DISCONNECT Alarm capability remains. When the HIGH AIRWAY PRESSURE ALARM Control is set to "OFF", a 100 cmH_2O Peak Inspiratory Pressure Relief default remains active.

During SIMV operation, MANDATORY breaths are delivered according to Uni- Vent™'s RATE, INSPIRATION TIME and gas FLOW ADJUST settings. When the MANDATORY breath is due to occur, Uni-Vent™ allows a window of time so that it may synchronize with the patient's next inspiration. If there is no inspiratory effort during this timing window, a MANDATORY breath is delivered at the end of the window regardless of patient effort.

During SIMV operation, MANDATORY breaths are delivered at the INSPIRATION TIME and gas FLOW ADJUST settings.

NOTE: Tidal volume can be quickly calculated by multiplying the FLOW ADJUST Control setting (using the ml/SEC scale) by the INSPIRATION TIME Control setting (in seconds, or fractions of seconds). A FLOW - INSPIRATION TIME - TIDAL VOLUME Chart is attached to Uni-Vent™'s lower cover.

3. Set desired ASSIST/SIMV SENSITIVITY. The ASSIST/SIMV SENSITIVITY control setting determines the trigger point of each synchronized MANDATORY breath relative to the patient's inspiratory effort.

4. Attach Patient Valve to patient's endotracheal or tracheostomy tube. The patient's spontaneous breathing should activate Uni-Vent™. If not, readjust the ASSIST/SIMV SENSITIVITY Control for greater triggering sensitivity (less negative pressure deflection). The INSPIRATION Lamp will illuminate only during the inspiratory portion of each MANDATORY ventilation.

MODES OF OPERATION, (cont'd)

AUGMENTED VENTILATION, (cont'd)

SYNCHRONIZED INTERMITTENT MANDATORY VENTILATION, (cont'd)

5. Attach PEEP Valve to Patient Valve and adjust to desired setting. Activate PEEP OFF/ON Push-button Switch. (See **USING POSITIVE END EXPIRATORY PRESSURE** for complete instructions).

NOTE: Excessive flows and/or inspiration times, occlusion of the patient circuit or a change in the patients physiological condition can cause a rise in inspiratory pressure. To safeguard the patient from high inspiratory pressures, Uni-Vent™ employs a protective Peak Inspiratory Pressure Relief system. Selection of a Peak Inspiratory Pressure Relief value corresponds to the HIGH AIRWAY PRESSURE ALARM Control setting. When the HIGH AIRWAY PRESSURE ALARM Control is set to "OFF" a default of 100 cmH_2O is invoked. Airway pressures, in excess of the Peak setting are automatically vented to atmosphere.

6. Activate the SIGH OFF/ON Pushbutton Switch if required. A SIGH ventilation is initiated then repeats once every 100 ventilations or 7-minutes, whichever occurs first. Each SIGH ventilation equals 150% of the INSPIRATION TIME setting, which increases delivered volume by 50%. However, as a safety precaution, Uni-Vent™ will automatically truncate SIGH to a combined maximum of 3-seconds.

DEMAND VALVE (Option)

Uni-Vent™'s optional DEMAND VALVE is funtional only in the SIMV mode. During SIMV operation, Uni-Vent™ is programmed to differentiate between spontaneous (non-assisted) breaths and MANDATORY ventilations (synchronized or nonsynchronized). A pressure deflection, less than 1 cmH_2O below end pressure, is required to activate the DEMAND VALVE solenoid. When a spontaneous (non-assisted) effort is detected, the DEMAND VALVE initiates a continuous, flow of gas into the Patient Valve. Demand flow is approximately 60 liters per minute which creates a slight pressure support in the patient/patient circuit. The level of pressure support will vary, inversely, relative to the patient's inspiratory effort. Demand flow will cease when expiratory pressure exceeds the pressure support by about 3 cmH_2O or following 3-seconds of continuous flow, whichever occurs first. During the inspiratory demand period, Uni-Vent™'s Patient Valve exhalation valve remains open. DEMAND VALVE operation is automatically referenced to PEEP (see **USING POSITIVE END EXPIRATORY PRESSURE**).

CAUTION: Pediatric demand flow requirements should be taken into account before using Uni-Vent™'s DEMAND VALVE. If Uni-Vent™'s demand flow is considered too great, substitute a circuit having lesser flow to the Patient Valve DEMAND VALVE inlet fitting (3/16" I.D.).

CONTINUOUS POSITIVE AIRWAY PRESSURE (CPAP)

Uni-Vent™'s Control Module RATE Control cannot be set to "0", thus traditional CPAP operation is not possible. Users may wish to consider the potential benefit of operating Uni-Vent™ in its SIMV mode, with a RATE setting of "1", and in conjunction with PEEP. The Control Module Front Panel INSPIRATION TIME and FLOW ADJUST Controls should be appropriately set (see sections **SYNCHRONIZED INTERMITTENT MANDATORY VENTILATION** and **ASSIST-CONTROL VENTILATION DURING APNEA**).

ASSIST-CONTROL VENTILATION DURING APNEA

As a safety precaution during apnea, Uni-Vent™'s microprocessor automatically switches from

MODES OF OPERATION, (cont'd)

AUGMENTED VENTILATION (cont'd)

ASSIST-CONTROL VENTILATION DURING APNEA (cont'd)

ASSIST-CONTROL or SIMV operation to a special ASSIST-CONTROL default mode and simultaneously activates its APNEA Alarm. This occurs when the period between positive and/or negative pressure deflections exceeds 19-seconds minus the INSPIRATION TIME Control setting (18.9 to 16.0 seconds).

When apnea is detected, Uni-Vent™ will default to a ventilation rate of 12 ventilations per minute and the current Control Module Front Panel settings for INSPIRATION TIME and FLOW ADJUST.

During the APNEA Alarm, it is possible to adjust the RATE Control setting to a rate greater than the default rate. However, if this control is set for a rate less than the default rate, the default rate will still prevail.

NOTE: The ASSIST/SIMV ON Indicator Lamp will not illuminate during apnea.

Depressing the ALARM MUTE Pushbutton Switch cancels the APNEA Alarm, stops ASSIST-CONTROL VENTILATION DURING APNEA and restarts normal ASSIST-CONTROL or SIMV operation to the current Control Module settings. The ALARM MUTE/CANCEL Lamp will remain illuminated for 30-seconds then blank.

USING POSITIVE END EXPIRATORY PRESSURE (PEEP)

IMPORTANT NOTE: To use Uni-Vent™'s PEEP function, an external PEEP valve must be connected to Uni-Vent™'s Patient Valve (see **PATIENT VALVE FUNCTIONAL DESCRIPTION** and Figure 4).

IMPORTANT NOTE: Uni-Vent™ uses a "single-hose" patient circuit. All inspiratory and expiratory valving is done at the Patient Valve. Since exhaled gas is not routed through the Control Module, Uni-Vent™ must derive PEEP information from waveform monitoring, through its pressure transducer, (in the PEEP AUTOmatic mode) or from direct programming (in the PEEP MANual mode). Uni-Vent™'s PEEP controls should not be activated unless an external PEEP valve (adjustable or fixed value) is connected to the Patient Valve.

Uni-Vent™'s PEEP function provides a means of converting the transducer calibration pressure reference from atmospheric pressure to atmospheric pressure + PEEP pressure. The PEEP function operates in two primary modes, automatic (AUTO) and manual (MAN).

In the AUTOmatic mode, Uni-Vent™'s microprocessor (CPU) analyzes the expiratory pressure waveform to determine the set PEEP reference value. Analysis consists of averaging three consecutive exhalations from the time the PEEP OFF/ON Pushbutton Switch is depressed. The clinician can display and verify this value, in the ALPHA/NUMERIC DISPLAY, by depressing the PEEP AUTO ON/DISPLAY Pushbutton Switch. The CPU continuously monitors expiratory signals, looking for changes in the PEEP value. When the monitored PEEP value exceeds the reference PEEP value by more than +/- 2cmH_2O for three consecutive breaths, the PEEP NOT SET Alarm will activates

In the MANual mode, a PEEP reference value is manually entered using the PEEP MANual DISPLAY/SET Pushbutton Switch. In this mode, the CPU does not monitor PEEP and the PEEP NOT SET Alarm becomes inactive.

MODES OF OPERATION, (cont'd)

USING POSITIVE END EXPIRATORY PRESSURE, (cont'd)

PEEP functions are accessed using the following switches:

PEEP OFF/ON Pushbutton Switch: In the OFF position, PEEP functions are disabled. Remove PEEP valve from Patient Valve (or set PEEP valve to "zero", if adjustable). In the ON position, AUTOmatic PEEP monitoring is activated and the PEEP OFF/ON Indicator Lamp illuminates.

When the PEEP OFF/ON Pushbutton Switch is depressed, Uni-Vent^{TM}'s CPU initiates averaging of three exhalation waveforms to determine the PEEP reference value. During this averaging period, the PEEP NOT SET Lamp will blink (the audible alarm is not activated) and a "bar" will revolve within the ALPHA/NUMERIC DISPLAY.

When averaging is complete, the PEEP reference value is shown in the ALPHA/NUMERIC DISPLAY for three seconds, and the blinking PEEP NOT SET Lamp blanks.

PEEP AUTO ON/DISPLAY Pushbutton Switch: The PEEP "AUTO ON" mode is automatically activated when the PEEP OFF/ON Pushbutton Switch is set to ON. This permits automatic monitoring of PEEP and illuminates the PEEP AUTO ON/DISPLAY Indicator Lamp. Depressing this switch will (1) initiate a mode change from PEEP MANual to PEEP AUTOmatic, or (2) display the reference PEEP value in the ALPHA/NUMERIC DISPLAY.

PEEP MANual DISPLAY/SET Pushbutton Switch: Depressing the PEEP MANual DISPLAY/SET Pushbutton Switch will illuminate the PEEP MANual DISPLAY/SET Indicator Lamp and (1) display the PEEP MANual setting in the ALPHA/NUMERIC DISPLAY, or (2) allows a PEEP MANual value to be manually entered and viewed in the ALPHA/NUMERIC DISPLAY.

To set a value of PEEP depress and hold the PEEP MANual DISPLAY/SET Pushbutton Switch for more than 3-seconds. This will cause a change from DISPLAY mode to SET mode and initiate scrolling within the ALPHA/NUMERIC DISPLAY.

The displayed value will increase from the current PEEP value up to 20 cmH_2O, return to 0, then scroll upwards again. When pressure is released from the PEEP MANual DISPLAY/SET Pushbutton Switch, the ALPHA/NUMERIC DISPLAY registers the MANual PEEP value set.

While the ALPHA/NUMERIC DISPLAY is indicating, the MANual PEEP value can be increased, in 1 cmH_2O increments, each time the PEEP MANual DISPLAY/SET Pushbutton Switch is depressed.

After 3-seconds, the ALPHA/NUMERIC DISPLAY will blank.

OPERATOR PERFORMANCE CHECKS

Before placing this instrument into operation, the operator can perform various operational checks to insure proper performance.

1. Verify operating power selections.

2. When using external power source (from Multivoltage AC Power Supply or 12 VDC Power Cable), insure that EXTernal POWER Indicator Lamp is illuminated.

3. Verify successful completion of SELF-CHECK.

4. Insure that all hoses, tubing and fittings are properly connected.

ALARM FUNCTIONS

Uni-Vent™ contains numerous alarm circuits, designed to alert attendant personnel and protect the patient. Alarm conditions, depending upon type, may be temporarily muted or cancelled. Mutable alarms will reset automatically when the alarm condition is no longer valid. A description of each alarm follows:

BATTERY LOW/FAIL Alarm: The BATTERY LOW/FAIL Alarm activates when Uni-Vent™'s internal battery voltage falls below 11 volts, or a shorted battery is detected.

EXTERNAL POWER LOW/FAIL Alarm: The EXTERNAL POWER LOW/FAIL Alarm activates when Uni-Vent™ senses an external power source failure or disruption.

LOW PRESSURE/DISCONNECT Alarm: The LOW PRESSURE/DISCONNECT Alarm activates when the patients airway pressure falls below the LOW AIRWAY PRESSURE ALARM Control setting for two consecutive inspiratory cycles. A disconnect in the patient circuit will also activate this alarm, regardless of setting.

DISCONNECT Alarm triggering occurs in all operating modes, however, the activation criteria is not the same for each mode:

CONTROL and ASSIST-CONTROL MODES - The microprocessor looks for a positive pressure rise of at least 1 cmH_2O to occur within 150% of the INSPIRATION TIME Control setting. If the required positive pressure rise does not occur within this period, the LOW PRESSURE/DISCONNECT Alarm activates.

SIMV MODE - For ventilator rates greater than 3-ventilations per minute, the LOW PRESSURE DISCONNECT Alarm functions as if the CONTROL or ASSIST-CONTROL MODES were set. For ventilator rates less than or equal to 3-ventilations per minute, the microprocessor alarm circuit activates when respirations (spontaneous and/or Uni-Vent™ generated) are undetected for a period of 19- seconds minus the INSPIRATION TIME control setting (18.9 to 16.0 seconds). To qualify the alarm condition as DISCONNECT or APNEA, the microprocessor automatically delivers a controlled ventilation at the INSPIRATION TIME setting. If a pressure rise of at least 1 cmH_2O occurs within 150% of the INSPIRATION TIME Control setting, the APNEA Alarm is activated. If a pressure rise is not detected, Uni-Vent™ returns to SIMV and activates its DISCONNECT Alarm, repeating this test every 30-seconds.

HIGH PRESSURE Alarm: The HIGH PRESSURE Alarm activates when the patient's airway pressure exceeds the HIGH AIRWAY PRESSURE ALARM Control setting for 2- seconds (continuous), or 50-milliseconds for four (4) consecutive ventilations. When the HIGH AIRWAY PRESSURE ALARM Control is set to "OFF" a safety default of approximately 100 cmH_2O remains (see **FAL Alarm** function, page 5 - 3).

The HIGH PRESSURE Alarm setting is also the safety setting for Peak Inspiratory Pressure Relief. Excessive flows and/or inspiration times, occlusion of the patient circuit or a change in the patients physiological condition can cause a rise in inspiratory pressure. To safeguard the patient from high inspiratory pressures, Uni-Vent™ compares the Peak Inspiratory Pressure against the HIGH AIRWAY PRESSURE ALARM Control setting.

When a high inspiratory pressure condition occurs (exceeding the HIGH AIRWAY PRESSURE ALARM Control setting by 5 cmH_2O), Uni-Vent™ interrupts the flow of gas to the patient circuit. This allows excess pressure to "dump" through the Patient Valve EXHALATION PORT to atmosphere, while allowing the INSPIRATION TIME cycle to continue. When the patient circuit pressure falls below the

ALARM FUNCTIONS, (cont'd)

HIGH PRESSURE ALARM, (cont'd)

trigger point (3 cmH_2O below the HIGH PRESSURE ALARM Control setting), gas flow is allowed to resume for the remainder of the inspiratory cycle. If the HIGH AIRWAY PRESSURE ALARM Control is set to "OFF" a Peak Inspiratory Pressure Relief safety default of approximately 100 cmH_2O remains (see **FAL Alarm** function, page 5 - 3).

APNEA Alarm: The APNEA Alarm is functional in the ASSIST-CONTROL and SIMV MODES. It activates when the period between positive and/or negative pressure deflections (spontaneous and/or Uni-Vent™ generated respirations) exceeds 19- seconds minus INSPIRATION TIME (18.9 to 16.0 seconds). **NOTE:** When PEEP is activated, Uni-Vent™ will look for positive pressure deflections only. When the APNEA Alarm sounds, Uni-Vent™ invokes its special ASSIST- CONTROL VENTILATIONS DURING APNEA mode. The APNEA Alarm can be cancelled by depressing the ALARM MUTE/CANCEL Pushbutton Switch. It is not mutable.

PEEP NOT SET Alarm: The PEEP NOT SET Alarm activates when monitored PEEP exceeds the PEEP reference value by +/- 2 cmH_2O for three consecutive respiratory cycles (see section **USING POSITIVE END EXPIRATORY PRESSURE**). **NOTE:** If a DISCONNECT Alarm occurs during normal operation, and is responsible for causing a PEEP NOT SET Alarm (PEEP AUTOmatic mode), Uni-Vent™ will restore the PEEP AUTOmatic mode to its pre-disconnect reference value when the causing disconnect problem is resoved.

ALARM MUTE/CANCEL Pushbutton Switch: The ALARM MUTE/CANCEL Pushbutton Switch, deactivates the audible portion of an existing alarm for a predetermined period (with the exception of certain power alarm conditions). Mute periods for BATTERY and EXTERNAL POWER Alarms normally last for 5-minutes. If an EXTERNAL POWER Alarm occurs and is muted, the mute period will last until the internal battery depletes. At this point, a BATTERY LOW/FAIL Alarm activates, in addition to the EXTERNAL POWER Alarm, and muting will now last for a 5-minute period. Conversely, a BATTERY LOW/FAIL Alarm will remain continuously muted if an external power source is connceted. LOW PRESSURE, DISCONNECT, HIGH PRESSURE and PEEP NOT SET Alarm mutes last for 30-seconds. In all instances, a new alarm condition will override a pre-existing "mute".

The ALARM MUTE/CANCEL Pushbutton Switch will cancel an APNEA Alarm allowing for Uni-Vent™ to resume operation in the ASSIST-CONTROL or SIMV MODE. The ALARM MUTE/CANCEL Pushbutton Switch will not effect the Alarm Indicator Lamps (except for the APNEA Lamp which it resets). The adjacent ALARM MUTE/CANCEL Lamp illuminates during mute periods and for 30-seconds following the cancellation of an APNEA Alarm.

INVERSE I/E Alarm: The INVERSE I/E Alarm is activated when the INSPIRATION TIME Control is set for a period which is longer than the expiratory period. When INVERSE I/E occurs, the RATE and INSPIRATION TIME Lamps alternately flash, a pulsing alarm tone sounds, and the ALPHA/NUMERIC DISPLAY Lamps register "- IE". INVERSE I/E Alarms are not mutable and must be corrected before further operation is permitted. Until corrected, Uni-Vent™ defaults to an "exhalation" (antiasphyxiation) condition. The INVERSE I/E condition can be corrected by lowering the RATE Control or INSPIRATION TIME Control settings (or both).

MEMORY CHECK Alarm: This alarm activates when the MEMEORY CHECK portion of SELF-CHECK fails. A beeping tone is heard and the ALPHA/NUMERIC DISPLAY is activated, continuously displaying "FAL". The MEMORY CHECK Alarm cannot be muted or cancelled.

ALARM FUNCTIONS, (cont'd)

TRANSDUCER CALIBRATION Alarm: The TRANSDUCER CALIBRATION Alarm activates when the pressure transducer "zero" baseline exceeds +/- 1 cmH_2O. When activated, an audible tone is heard and the ALPHA/NUMERIC DISPLAY alternately flashes "---" and "the current transducer calibration value". The TRANSDUCER CALIBRATION Alarm resets itself after recalibration is completed (see **TRANSDUCER CALIBRATION**).

TRANSDUCER CALIBRATION ABORT Alarm: The TRANSDUCER CALIBRATION ABORT Alarm activates when the TRANSDUCER CALIBRATION procedure is prematurely stopped. When activated, a steady tone is emitted and the ALPHA/NUMERIC DISPLAY alternately flashes "---" and "the current transducer calibration value". The TRANSDUCER CALIBRATION ABORT Alarm will reset itself when recalibration is performed.

FAL Alarm (ALPHA/NUMERIC DISPLAY): The FAL Alarm activates when a RAM (random access memory) or ROM (read only memory) failure occurs during operation in the CONTROL, ASSIST-CONTROL or SIMV operating modes. It will also activate if a continuous pressure above 95 cmH_2O is sensed in the patient circuit for more than 0.5-seconds. When activated, a beeping tone is emitted and "FAL" is displayed in the ALPHA/NUMERIC DISPLAY. A FAL Alarm will cause Uni- Vent™ to cease operation, in a non-gas flowing condition, allowing patient circuit pressure to vent to atmosphere (or the preset PEEP value). Uni-Vent™ must be turned OFF, then restarted, to clear an FAL condition. During an FAL condition, the patient can breath spontaneously through the ANTIASPHYXIATION/DEMAND VALVE INLET PORT.

ROUTINE CARE AND MAINTENANCE

CLEANING

Keep Uni-Vent™ and its accessories clean at all times. Never allow grease and oil to enter the system or coat its components. Exposed parts should be dried following usage in wet environments. Users are encouraged to clean this device and its accessories at regular intervals and maintain up-to-date records of maintenance and inspections.

CONTROL MODULE: The Control Module should be kept clean and free of dirt, oil and grease. Internal pneumatic components are sealed, thus routine maintenance is not required. Pressure hose connections should be wiped with a damp, soapy cloth and thoroughly dried with a lint-free cloth. The Uni-Vent™ Control Module housing may also be cleaned as necessary with a damp, soapy cloth and thoroughly dried with a lint-free cloth. Do not clean with abrasives or chlorinated hydrocarbon cleaners.

PATIENT VALVE: The Patient Valve housing is injection molded from polysulfone. It may be sterilized by autoclaving or ethylene oxide gas. The exhaust and leaf valves are molded from silicone, they too can be autoclaved or gas sterilized.

NOTE: Before disassembling Patient Valve review section entitled **PATIENT VALVE FUNCTIONAL DESCRIPTION** and refer to Figure 4.

Disconnect the Patient Valve from all connecting hose(s). Remove the threaded collar which secures the EXHAUST PORT Fitting to the Patient Valve main body. Remove the EXHAUST PORT, the PATIENT INTERFACE Elbow and the GAS INLET PORT Elbow.

From the Patient Valve main body, remove the two (2) leaf valves using small forceps or tweezers (*do not squeeze tightly or tear leaf valves*). From the EXHAUST PORT Fitting, remove the flat leaf valve using small forceps or tweezers (*do not squeeze tightly or tear leaf valve*). If required, unscrew the diaphragm valve from the EXHAUST PORT fitting. Examine the diaphragm and leaf valves for signs of wear, cracks or stiffness - relace as necessary.

After cleaning, carefully reassemble all components. Leaf valves must be pulled until they "lock" into position. Two leaf valves have stems which can be "grabbed" with small forceps or tweezers. The flat leaf valve must be seated flush against its seating surface. Small forceps or tweezers may be used.

Pressure Hose: Examine the pressure hose for cracking, discoloration and disfigurement. Wipe exterior wall with a damp, soapy cloth. Dry with a lint- free cloth. Examine end connection fittings for damaged threads and sharp edges. Replace if defective, **DO NOT** attempt to repair.

REUSABLE TUBING: 10mm I.D. spiral with silicone cuffs, 1/8" I.D. and 3/16" I.D. hoses can be reused following cleaning and sterilization by autoclave or ethylene oxide gas.

DISPOSABLE TUBING: 10mm I.D. spiral, 1/8" I.D. and 3/16" I.D. hoses should be disposed of following single patient use.

PEEP VALVE: Disposable PEEP Valves should be discarded following single patient use. Reusable PEEP valves should be cleaned in accordance with directions provided by their respective manufacturer.

ROUTINE CARE AND MAINTENANCE, (cont'd)

MAINTENANCE

Routine maintenance should be performed on this instrument at regular intervals and prior to its being placed into service. Routine maintenance should consist of the following:

1. Cleaning checks - as described above.

2. Operational checks - as described in **OPERATOR PERFORMANCE CHECKS.**

3. Tubing and hose checks - replaced crimped, cracked or worn tubing and hose as required.

4. Depending upon the frequency of use, usage environment and cumulative hours of use, Uni-Vent™ should have its flow control valve, solenoids and pressure regulator checked at regular intervals for wear, cleanliness and performance.

A calibration check should be made following each cumulative period of 1000 hours of operation.

A yearly calibration check is recommended if the usage environment is particularly harsh, i.e.; hot and cold temperature extremes, areas of extreme humidity or dryness, or usage in transport vehicles exposed to excessive vibration.

Contact your local Uni-Vent™ Representative or the Impact Customer Service Department 201/882-1212 for calibration check scheduling.

BATTERY CARE AND RECHARGING

The Uni-Vent™ Model 750/750M uses sealed lead-acid batteries, "starved- electrolyte" type, which offer a wide temperature operating range, do not exhibit "memory" characteristics (reduced capacity) or vent hydrogen gas. The life of these batteries depends, to a great extent, upon the care they receive. Following these simple guidelines will prevent premature charge depletion and reduction of battery life.

- DO NOT operate this instrument where the temperature range exceeds -60°C to 60°C (-76°F to 140°F).
- DO NOT charge this instrument where the temperature range exceeds -20°C to 50°C (-4°F to 122°F).
- DO NOT store this instrument with the batteries discharged. Always store in a charged condition.
- For long-term storage, the optimum storage temperature range is 10°C to 30°C (50°F to 80°F).

Sealed lead acid batteries exhibit excellent charge retention characteristics. Prolonged periods of disuse will not substantially reduce operating capability. If long-term disuse is common, it would be advisable to recharge the unit once every two months. This will insure that battery charge is maintained at 80% capacity or better. Recharge time ranges from 14 - 16 hours, depending upon initial state of discharge. Continuous charging is permissible with the 12 VDC Power Cable or Multivoltage AC Power Supply furnished with Uni-Vent™. The EXTERNAL POWER/CHARGER Jack is located along the top edge of the Uni-Vent™ case. The "EXTERNAL PWR" Lamp will illuminate when the charging accessory is properly connected between Uni-Vent™ and a live power source.

Uni-Vent™ will accept a wide range of inputs for operating power and battery recharge purposes. Standard accessories, as mentioned in the previous paragraph, are provided. For special applications requiring non-standard accessories, the following requirements are intended to serve as guidelines:

- Input Voltage: 12 VDC (nominal)
- DC Ground: Negative
- DC Power: 8.0 Watts (over the input voltage range)

Operating power will default to the external power source to preserve internal batteries for portable or transport use, emergency back-up or recharging purposes. Uni-Vent™ will automatically revert to its internal batteries for operating power if an EXTERNAL POWER LOW/FAIL Alarm occurs.

NOTE: Uni-Vent™ includes a dedicated charging circuit. This insures that recharge times will be the same during operating and non-operating periods.

BATTERY CARE AND RECHARGING (cont'd)

BATTERY REPLACEMENT

Periodic replacement of Uni-Vent™'s batteries can be accomplished quickly and easily. Please follow these simple instructions:

(1) The battery compartment door is located immediately to the left of the clear, Control Panel door.

(2) Turn each battery compartment door locking knob one-half turn counterclockwise to unlock.

(3) Open battery compartment door.

(4) Release battery pack restraint strap.

(5) Separate battery pack electrical connector.

(6) Remove old battery pack from its compartment.

(7) Place new battery pack in battery compartment.

(8) Reconnect battery pack electrical connector.

(9) Secure battery pack restraint strap.

(10) Carefully close battery compartment door and turn locking knobs one-half turn clockwise to lock.

(11) Before returning Uni-Vent™ to service, verify battery operation.

IN CASE OF DIFFICULTY

Authorization to service this instrument by other than factory-trained and certified personnel will not be given, nor does Impact Instrumentation, Inc. assume any responsibility and/or liability resulting from such unauthorized servicing.

Impact will, upon request, provide competent biomedical engineering departments with service data and schematics. Such departments are encouraged to contact the factory for assistance when needed and it is recommended that staff members attend a factory training course. Details may be obtained by contacting the Impact Customer Service Department.

OPERATOR CORRECTABLE PROBLEMS

Common problems may be quickly rectified by users. Should Uni-Vent™ fail to operate properly, verify the integrity of all hose, tubing and fitting connections. Check all Control Module settings. Check for operating power with internal batteries and external power source(s). Verify successful SELF- CHECK, perform TRANSDUCER CALIBRATION if required.

OPERATOR PROBLEMS REQUIRING SERVICE

If the tests described above do not resolve an operating problem, service is required. Should servicing be necessary, contact your nearest Impact Representative or the Impact Customer Service Department 201/882-1212. Please have the Model and Serial Number ready and any other pertinent data you wish to include in the service request.

STORAGE INFORMATION

For prolonged storage periods, the Model 750/750M should be stored indoors. The environment should be clean and out of direct sunlight. Storage in non-controlled environments is permissible if batteries are removed.

If batteries are not removed, short-term storage temperatures should range between 5°F and 104°F (-15°C to 40°C), relative humidity should be low. For long-term storage, the optimum storage temperature range is 50°F to 80°F (10°C to 30°C).

DO NOT store batteries in a discharged condition.

When batteries are in extended storage, it is recommended that they receive a refresh charge at recommended intervals:

STORAGE AMBIENT	RECHARGE INTERVAL
Below 68°F (20°C)	18-months
68° to 86°F (20° to 30°C)	12-months
86° to 104°F (30° to 40°C)	6-months

Following periods of extended storage in non-controlled environments, allow Uni-Vent™ sufficient time to stabilize to a temperature within its specified operating range (see section entitled **BATTERY CARE AND RECHARGING**).

SPECIFICATIONS

OPERATING MODES: CONTROL - with/without PEEP, with/without SIGH
ASSIST-CONTROL - with/without PEEP, with/without SIGH
SIMV - with/without PEEP, with/without SIGH

FLOW RATE: Adjustable, 0 to approximately 100 LPM @50 PSI (0 to approximately 1600 ml/SEC)

VENTILATION RATE: Adjustable, 1 to 150 breaths per minute, resolution 1 breath per minute increments (+/- 1 digit on the display panel)

INSPIRATION TIME: Adjustable, 0.1 to 3.0 seconds, resolution in 0.1 second increments (+/- 1 digit on the display panel)

LOW PRESSURE ALARM: Adjustable, OFF to 50 cmH_2O, resolution in 1 cmH_2O increments (+/- 1 digit on the display panel)

HIGH PRESSURE ALARM: Adjustable, 15 to 100 cmH_2O (OFF), resolution in 1 cmH_2O increments (+/- 1 digit on the display panel)

PEAK INSPIRATORY PRESSURE RELIEF: Adjustable, 15 to 100 cmH_2O, resolution in 1 cmH_2O increments (+/- 1 digit on the display panel)

ASSIST/SIMV SENSITIVITY: Adjustable, -2 to -8 cmH_2O, resolution in -2 cmH_2O increments

AUTOmatic PEEP: Monitor range 1 to 20 cmH_2O, resolution in 1 cmH_2O increments (+/- 1 digit on the display panel)

MANual PEEP: Program range 1 to 20 cmH_2O, resolution in 1 cmH_2O increments (+/- 1 digit on the display panel)

SIGH: Initiates upon activation then once every 100-ventilations or 7-minutes thereafter, whichever occurs first. SIGH = 150% of inspiration time (truncated to a combined maximum of 3-seconds)

ALPHA/NUMERIC Displays: RATE, INSPIRATORY TIME, LOW PRESSURE ALARM, HIGH PRESSURE ALARM, PEEP AUTOmatic, PEEP MANual, PEAK AIRWAY PRESSURE, MEAN AIRWAY PRESSURE, P_{aw}

INDICATOR Lamps: RATE, INSPIRATORY TIME, INSPIRATION, LOW PRESSURE ALARM, HIGH PRESSURE ALARM, PEEP OFF/ON, PEEP AUTOmatic, PEEP MANual, SIGH OFF/ON, PEAK AIRWAY PRESSURE, MEAN AIRWAY PRESSURE, P_{aw}, EXTERNAL POWER, POWER, ASSIST/SIMV ON

DIGITAL BAR GRAPH: Display range -10 to 100 cmH_2O, mixed resolutions

ALPHA/NUMERIC ALARM DISPLAYS: INVERSE I/E, MEMORY CHECK, TRANSDUCER CALIBRATION, TRANSDUCER CALIBRATION ABORT, FAL

ALARM INDICATOR LAMPS: LOW PRESSURE/DISCONNECT, HIGH PRESSURE, EXTERNAL POWER LOW/FAIL, BATTERY LOW/FAIL, PEEP NOT SET, APNEA, ALARM MUTE/CANCEL

SPECIFICATIONS, (cont'd)

MANUAL TRIGGER: Operator controlled manual override of current operating mode

OPERATING VOLTAGES: CONTROL MODULE: Input: 12 volts, DC (Negative ground)

Multivoltage AC Power Supply: Input: Selectable 115/230 VAC, 50-400 HZ; Input: 11-30 volts AC, 50-400 HZ; Input: 11-30 volts DC (Positive or Negative ground); Output: Nominal 12 VDC, (Positive ground), 1.5 A (max)

OPERATING TIME: Internal Batteries: 9-hours with standard battery pack 11-hours with optional battery pack
External AC: Continuous
External DC: Continuous

TEMPERATURE RANGES: OPERATING: -60°C to 60°C (-76°F to 140°F)
CHARGING: -20°C to 50°C (-4°F to 122°F)
LONG TERM STORAGE: 10°C to 30°C (50°F to 80°F)

SIZE: 9.0" Wide (9.4" including battery compartment locking ribs) X 11.5" High X 4.5" Deep
22.9 cm Wide (23.9 cm including battery compartment locking ribs) X 29.2 cm High X 11.4 cm Deep)

WEIGHT: Control Module: Less than 10 lbs (including battery)(less than 4.5 kg)
Multivoltage AC Power Supply: 2.5 lbs (1.14 kg)

WARRANTY: Limited, 1-year (see **LIMITED WARRANTY** statement)

LIMITED WARRANTY

Impact Medical Corp., warrants this instrument to be free from all defects in materials and worksmanship for one (1) year. Batteries, which by their nature are consumable and subjected to environmental extremes, will be warranted only for a period of ninety (90) days. Accessories, also consumable in usage, such as connecting hose, are not warranted. Repairs made in accordance with this LIMITED WARRANTY shall be warranted for the remainder of the original warranty period. This warranty is neither assignable nor transferable, nor does it apply if this instrument is tampered with, misused or serviced by unauthorized personnel. All warranty repairs shall be subject to return postage billing.

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SECTION II. SERVICE

INTRODUCTION

The information contained herein is intended only for use by factory-trained, and certified personnel or military personnel trained in the care and servicing of this product. The manufacturer does not authorize or assume any obligations resulting from unauthorized servicing nor will it be held liable for any injuries or damages incurred therefrom.

Impact Instrumentation will provide service training at the manufacturing site at no schooling charge to users; however, travel and meal costs resulting therefrom shall be borne by the user. Training at the user's site will result in travel, meal and time costs charged to the user at prevailing rates. The Impact service facility encourages dialogue from user service personnel towards rectifying any service related matter. All service requests may be addressed to the Service Manager, Impact Instrumentation, Inc., 27 Fairfield Place, West Caldwell, New Jersey 07006, 201/882-1212.

Should factory servicing become necessary, or technical assistance is required, please have the Model 750/750M Serial Number ready and any other pertinent data you wish to include in your service request. The Model 750/750M Serial Number is located on the outer case identification label.

CAUTIONARY NOTE

Prior to servicing this device, be aware of the presence of potentially dangerous operating voltages.

HELPFUL HINTS

Before attempting to repair/calibrate this instrument, please take a few moments to insure that the problem is not accessory related. Check the integrity of all tubing and fittings. Verify that tubing is not crimped or cracked due to fatigue.

Refer to the schematic and assembly pictorials when trouble shooting. Isolate the problem to a functional segment of the circuitry. Always insure the integrity of circuit ground and the correct mains voltages.

Always safeguard your personal well being when troubleshooting electronic circuitry. Keep jewelry and liquids from the vicinity of active circuitry.

DISASSEMBLY/REASSEMBLY

REQUIRED TOOLS

Screwdriver, slotted, 6" to 8" long, small tip
Screwdriver, phillips head, medium size
1/4" socket with drive handle
5/16" socket with drive handle
3/8" socket with drive handle
Pliers, needle nosed
Open end wrench, adjustable, 10"
Open end wrench set, 1/4" to 5/8"
Bench vise with smooth jaws
Allen wrench, 1/16"
Diagonal Cutters
Cable Tie, Miniature

DISASSEMBLY/REASSEMBLY

LOWER CASE

Verify that Mode Selector Switch is in the OFF position. Disconnect all hoses and cables. Open the Battery Compartment Door, disconnect the Battery Pack connector, and release the Velcro™ holddown strap. Remove Battery Pack. Unscrew two (2) 6-32 Phillips Bind Head screws (located inside the Battery Compartment) that connect the Upper and Lower Covers. Turn unit over so that its Lower Cover is facing upward. Unscrew six (6) 6-32 Phillips Bind Head screws which secure the Upper and Lower Covers. **DO NOT** unscrew the one (1) 6-32 Phillips Bind Head screw that is on the bottom of the Lower Cover adjacent to the Condensed Operating Instructions label. The Lower Cover can now be lifted from the Upper Cover Assembly. To reassemble, reverse the above process. Insure that Battery Pack connector wires are not crimped between components.

BATTERY COMPARTMENT, CLEAR FRONT COVER AND UPPER CASE

Do the following only if servicing the Battery Compartment Separator, Battery Compartment Door, Clear Front Cover or Upper Case. Otherwise proceed to the next step.

With the Diagonal Cutter, cut the miniature cable tie that secures the battery connector wires to the Battery Compartment Separator. **DO NOT** cut any other cable tie. Using the 1/4" socket with drive handle, remove the three (3) 4-40 keps nuts and #4 flat washers that secure the Battery Compartment Separator, Battery Compartment Door and the Clear Front Cover. Remove the Battery Compartment Separator, Battery Compartment Door and Clear Front Cover. Remove the remaining three (3) 4-40 keps nuts that secure the Membrane Panel to the Upper Case. Pull bottom of Upper Case upwards until it is inbetween the EMI Shield and Power Supply Printed Circuit Board (**no higher**). Pull top of Upper Case above Manifold Assembly, but not above Front Panel. Pull bottom of Upper Case past Power Supply Printed Circuit Board and Linear Regulator Mounting Bracket. Remove Upper Case. To reassemble, reverse this process exactly. Replace cable tie. Insure that Battery Pack connector wires are not crimped by Upper Case and Membrane Panel.

LINEAR REGULATORS MOUNTING BRACKET AND LINEAR REGULATORS PRINTED CIRCUIT BOARD

Unscrew four (4) 4-40 Slotted Bind Head screws and lockwashers which secure the Linear Regulators Mounting Bracket to the Power Supply Printed Circuit Board. Lift the Linear Regulators Mounting Bracket to separate its header pins from the Power Supply Printed Circuit Board. To reassemble, reverse this process. Make sure that header pins and their respective socket align.

POWER SUPPLY PRINTED CIRCUIT BOARD

Unscrew four (4) hex, male-to-female 4-40 spacers which secure the Power Supply Printed Circuit Board to the EMI Shield and CPU Printed Circuit Board. Unplug the 5-Pin connector. Lift the Power Supply Printed Circuit Board to separate its header from the CPU Printed Circuit Board. Reverse this process to reassemble. Make sure that header pins and their respective socket align, and that the pressure sensitive mylar spacer is inbetween the hex spacer and Power Supply Printed Circuit Board in the lower left corner.

EMI SHIELD

Unscrew four (4) hex, male-to-female 4-40 spacers which secure the EMI Shield to the CPU Printed Circuit Board. Reverse this process to rassemble.

CPU PRINTED CIRCUIT BOARD

Unscrew four (4) 1/4" hex, male-to-female 4-40 spacers and two (2) 4-40 Slotted Bind Head screws which secure the CPU Printed Circuit Board to the Display Printed Circuit Board. Lift the CPU Printed Circuit Board to separate its header from the Display Printed Circuit Board. Reverse this process to reassemble. Make sure that header pins and their respective socket align.

DISPLAY PRINTED CIRCUIT BOARD

Unscrew four (4) hex, female-to-female 4-40 spacers that secure the Display Printed Circuit Board to the rear of the Membrane Panel. Carefully turn the unit over, with its clear door opened. Remove the six (6) small collet knobs by removing their caps and loosening their locking screws. Underneath each collet knob skirt is a nut, carefully remove the six (6) nuts. Remove the Manual Trigger button and unscrew its protective nut. Separate the ribbon cable connecter between the Membrane Panel and Display Printed Circuit Board. The Display Printed Circuit Board can now be removed. To reassemble, reverse this process. Be careful not to scratch the membrane panel. When placing collet knobs back on panel, insure that each switch and control is in its full counterclockwise position - this will permit proper knob pointer alignment. Make sure that the ribbon cable connector is properly aligned and attached.

CONNECTOR PANEL

Remove two (2) 9/16-18 chrome hex nuts. Unscrew two (2) 4-40 self-tapping screws to free the buzzer. Unscrew two (2) 4-40 self-tapping screws to free the Power Jack (note its orientation). Reverse this process to reassemble.

MANIFOLD

The Manifold Assembly should not be disassembled unless it is absolutely necessary. Its alignment and correct positioning of the Flow Control Knob are critical. Under normal conditions treat the Manifold and Membrane Panel as one assembly.

MEMBRANE PANEL

Unscrew the six (6) 4-40 Keps nuts and 4-40 Hex spacers. Beneath the nuts and spacers are #6 flat washers. Remove them too. The Membrane Panel can now be removed from the Top Cover. To reassemble, reverse this process.

CALIBRATION PROCEDURE

The Model 750/750M transducer requires a periodic calibration check. This check can be determined by performing the Transducer Calibration procedure as described in the Operator's section of this manual. Should this process fail to "zero" the pressure transducer, an "internal" calibration will be required.

Note: The internal calibration described below is the only calibration required for the Model 750/750M.

EQUIPMENT REQUIRED

Screwdriver, slotted, 6" to 8" long, small tip

PROCEDURES

1. Remove Upper Case Assembly from Lower Case Assembly (see Disassembly instructions). This provides access to the printed circuit boards.

2. Place Mode Control Switch in CAL position.

3. Adjust R13 on the Power Supply Printed Circuit Board until the Bar Graph LED representing 0 cmH_2O illuminates. This adjustment can be made with all Printed Circuit Boards attached. Carefully locate R13 on the Power Supply Printed Circuit Board assembly drawing. Once R13 is located, adjustment can be made using the small slotted screwdriver mentioned above.

4. Reassemble the Upper and Lower Case Assemblies.

CALIBRATION DIFFICULTIES

1. If at least one LED of the Bar Graph does not illuminate in the CAL position, turn the Mode Selector Switch off and then reset it back to the CAL position.

2. Trouble shoot CAL and LED Bar Graph circuitry as required if there is no Bar Graph illumination.

3. If difficulties persist, contact Service Department, Impact Instrumentation, Inc., 201/882-1212.

CIRCUIT DESCRIPTIONS

(Refer to attached Schematic and Assembly drawings).

Circuit descriptions are divided into four parts: Power, Input, Processor and Output.

CONVENTION - To assist service personnel, suffix designators have been applied to the components discussed in the following circuit descriptions. Each suffix designator provides a geographical reference for the circuitry being described.

-1 : Analog/Power Supply Printed Circuit Board (PCB)
-2 : CPU Printed Circuit Board (PCB)
-3 : Display Panel Printed Circuit Board (PCB)
-4 : Membrane Panel

Examples: U1-1 means U1 on the Analog/Power Supply PCB.
U1-2 means U1 on CPU PCB.

Schematic labelling is printed as it appears in the schematics, in captial letters, in the following circuit descriptions.

1.0 Power

1.1 First stage power regulator

It consists of MC78T08 linear voltage regulator (U3-1) which takes a +12V input and outputs +8V, C7-1, and C8-1

1.2 Second stage power regulator

1.2.1 Battery charger switching power supply

It consists of switching power supply (U4-1), R25-1, R26-1, R27-1, R28-1, R29- 1, R30-1, R31-1, R32-1, R33-1, C12-1, C13-1, C14-1, C16-1, C36-1, D8-1, D9-1, and L2-1. The input is +8V and output is +14.2V

1.2.2 +5 V power regulator

It consists of LM7805 linear voltage regulator (U5-1), C17-1, C18-1, and C19-1. It takes a +8V input and outputs +5V.

1.2.3 +6 V power regulator

It consists of LM7806 linear voltage regulator (U8-1), C22-1, C23-1, and C24- 1. It takes a +8V input and outputs +6 V.

1.2.4 -6 V power regulator

It consists of ICL7660 voltage inverter (U7-1), C25-1, and C26-1. It takes a +6V input and outputs -6V.

1.2.5 11-30 V power detection

If input power is lower than +11 V, comparator (U6-1) pin 2 goes low which turns on Q5-1. SYSPWR which is connected to BATTPWR (in all modes except "OFF") will then power up the system through

Q5-1, D12-1, U5-1, U7-1, and U8-1. At the same time, U6-1 pin 14 is low which signals the microcontroller that external power is low. U6-1 pin 1 also goes low which turns off the battery charging circuit U4-1.

On the other hand if input power is higher than +11V, U6-1 pin 2 goes high which turns off Q5-1. The internal battery no longer powers the system. The system is now powered by the external source. At the same time, U6-1 pin 14 is high which signals the microcontroller that external power is good. U16-1 pin 1 is high which turns on the battery charging circuit.

If input power is higher than +30 V, U6-1 pin 13 goes low which signals the microcontroller that external power is no good (too high).

2.0 Input

2.1 Analog to Digital Converter (ADC)

The ADC (U5-2) is read by the Microcontroller (U1-2), sequentially, every 10- msec one input at a time (first PRESSURE is read, next is RATEPOT, then INSPOT, and so on). The clock for the ADC is provided by frequency divider (U9-2), and power is provided by the voltage reference circuit which comprises R12-1, R13- 1, R14-1, R15-1, Q2-1, C37-1, and U2-1.

2.1.1 Pressure

The pressure signal is acquired through the pressure transducer. The pressure transducer gets its supply current from a constant current supply which consists of R1-1, R2-1, Q1-1, and 1/4 of U1-1 (pins 5,6,7). The transducer signal is then amplified by a differential amplifier which consists of 3/4 of U1-1, R3-1, R4-1, R5-1, R6-1, R7-1, R8-1, R9-1, R10-1, C1-1, C2-1, C3-1 and C4- 1. DC offset can be adjusted by R13-1. Before going to the ADC (U5-2), the signal is clipped to ground and +4.5V by D1-1 and D2-1, and then filtered by R11-1 and C5-1.

2.1.2 Inspiration rate

The inspiration rate signal is acquired through VR4-3, and buffered by U3-3 (pins 1,2,3) before going to the ADC (U5-2).

2.1.3 Inspiration time

The inspiration rate signal is acquired through VR3-3, and buffered by U3-3 (pins 5,6,7) before going to the ADC (U5-2).

2.1.4 Low pressure alarm threshold

The inspiration rate signal is acquired through VR2-3, and buffered by U3-3 (pins 8,9,10) before going to the ADC (U5-2).

2.1.5 High pressure alarm threshold

The inspiration rate signal is acquired through VR1-3, and buffered by U3-3 (pins 12,13,14) before going to ADC (U5-2).

2.1.6 Charger voltage

The charger voltage signal is acquired from VCHGR (cathode of D8-1), divided by R22-2 and R23-3, and then buffered by U16-2 (pins 12,13,14).

2.1.7 Battery voltage

The battery voltage signal is acquired from BATTPWR, divided by R20-2 and R21- 3, and then buffered by U16-2 (pins 12,13,14)

2.1.8 Reserved

2.2 Keyboard

2.2.1 Dedicated input line

Microcontroller (U1-2) reads the latch/buffer (U4-3) every 10-ms to determine if any key has been depressed. Pull up is by SP1-3.

2.2.2 Matrix

Microcontroller (U1-2) reads buffer (U2-3) every 10-ms to determine if any key has been depressed. Pull up is by R1-3, R2-3, R3-3, R4-3. D1-3, D2-3, D3-3, and D4-3 protect the output of U2-3 which is high, from shorting to ground if a key is depressed.

3.0 Processor

3.1 Microcontroller

The microcontroller is an 8031 (U1-2). It runs at 6 MHz (C1-2, C2-2, X1-2). A latch (U4-2) is needed because the lower address (bits 0-7) and data bus is multiplexed. This microcontroller has I/O ports (pins 1-8) that are used to control the speaker (DVOL1 AND DVOL2), LED (LEDOUTCTL), Main valve (GASVALVE), and EEPROM read/write (pins 1-4). Peripheral devices are addressed by decoder (U7-2).

3.2 Reset Circuit

The reset circuit comprises R1-2, D3-2, C3-2, and U15-2. It gives a good reset to the microcontroller at power up.

3.3 Watchdog timer

The watchdog timer (U10-2) is probed by the microcontroller every 10-msec. If the microcontroller is not running, U2-10 will output a square wave which will reset the microcontroller, disable the main valve, and sound an alarm.

3.4 EEPROM

The EEPROM (U8-2) is used to store nonvolatile calibration pressure data.

3.5 EPROM

This EPROM (U2-2) is used to store program information which is executed by the microcontroller (U1-2).

3.6 Random Access Memory (RAM)

The RAM (U3-3) is used to store volatile data which is used by the microcontroller while the program is running.

3.7 One-shot

The One-shot circuit consists of U15-2, U13-2, C6-2, C7-2, C8-2, R4-2, R5-2, D2-4, and U11-2. It is triggered by the microcontroller through GASVALVEN1 and GASVALVEN2. The pulse width is 6.2 seconds which allows a maximum opening of main valve for 6.2 secs.

4.0 Output

4.1 Main valve

Main valve operation is controlled by microcontroller (U1-2) through buffer (U17-2), Q1-5, and Q2-5. It is disabled when the watchdog timer is pulsing (microcontroller is not running). It is open, continuously, when VALVE1(TRGSW) is depressed (grounded).

4.2 Demand valve

Demand valve operation is controlled by the microcontroller (U1-2) through buffer (U6-2), U17-2) and Q5-2.

4.3 7-Segment display

The 7-segment display is controlled by the microcontroller to display numbers and limited characters on DG1-3 and DG23-3. The 7-segment display is driven by the 8-bit LED Multiplexed Display Driver (U1-3).

4.4 Bar graph display

Thc bar graph display is controlled by the microcontroller to display bar graph segments on BAR1-3 and BAR2-3. The bar graph display is driven by the 8-bit LED Multiplexed Display Driver (U1-3).

4.5 LEDs display

LED illumination is controlled by the microcontroller. LED's are driven by the 8-bit LED Multiplexed Display Driver (U1-3).

NOTE

Waveforms and voltage measurements have been noted at various locations on each schematic drawing. In most cases, considerable leeway has been given as to what constitutes an acceptable voltage value in order to maintain device performance over a broad range of conditions.

PREVENTATIVE MAINTENANCE INSPECTIONS

Preventative maintenance inspections should be incorporated on a routine basis to insure proper device performance. These inspections should consist of both visual and performance checks, and cleaning when warranted.

Preventative maintenance inspections (PMI) should be made as follows:

If monthly usage is less than 50 hours - PMI bimonthly.

If monthly usage is greater than 100 hours - PMI monthly.

VISUAL CHECKS: Visual checks should include, but not be limited to:

1. Inspect hose, connecting tubing, fittings and Patient Valve Assembly for cracks, crimps, leakage and general wear. Replace defective tubing and hoses. Repair and/or replace fittings and Patient Valve component parts as necessary.

2. Check battery recharging accessory cables for worn, cracked or exposed wires. Repair and/or replace cables with worn, cracked or exposed wires.

3. Check Control Module Case for wear, loose or missing hardware and cracks. Replace missing hardware. Tighten loose hardware. Repair and/or replace worn or damaged component parts.

PERFORMANCE CHECKS: Performance checks should include, but not be limited to:

1. Check for tactile feel and operation of switches and controls.

2. Check the various operating modes (refer to the **OPERATOR PERFORMANCE CHECKS** section in the **OPERATION** portion of this manual).

CLEANING: Refer to the **ROUTINE CARE AND MAINTENANCE "CLEANING"** section in the **OPERATION** portion of this manual.

TROUBLESHOOTING GUIDE

SYMPTOM: No external AC power.

Is EXT POWER LED illuminated? Check for active (live) mains line.

SYMPTOM: No internal DC power.

Place batteries on charge, insure illumination of EXT POWER LED. Check battery charging current. Replace battery pack if necessary.

SYMPTOM: No power to Control Module.

Check output of battery pack. Check power jack integrity. Check integrity of 5-pin connector on Power Supply PCB. Check output of Multivoltage AC Power Supply.

SYMPTOM: Internal DC power weak.

Place batteries on charge, insure illumination of EXT POWER LED. Check battery charging current. Replace battery pack if necessary.

SYMPTOM: Unable to select triggering sensitivity.

Replace ASSIST/SIMV Sensitivity Control.

SYMPTOM: No gas flow to patient circuit.

Check for wiring intergrity at solenoid manifold, loose ribbon cable connection or hose disconnect.

SYMPTOM: No variation in airway pressure being read on Digital Bar Graph.

Check for hose connection between Transducer (located on Power Supply PCB) and Connector Panel.

SYMPTOM: Unable to hold pressure in patient circuit.

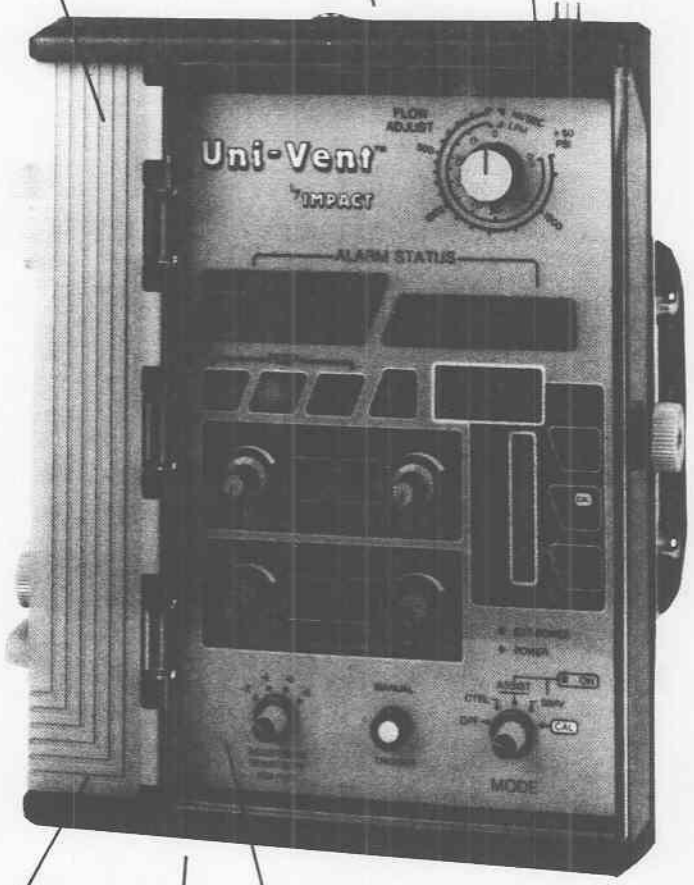
Check for leaks in hoses, patient and PEEP valves.

SYMPTOM: Low output flow to patient circuit.

Verify that inlet gas pressure is furnished from a 50 PSI high flow source, not from a low flow oxygen therapy regulator.

TECHNICAL DOCUMENTATION

NOTE: Refer to applicable Bill Of Material for Part Number description.



CONNECTOR PANEL ASSEMBLY

BATTERY PACK ASSEMBLY

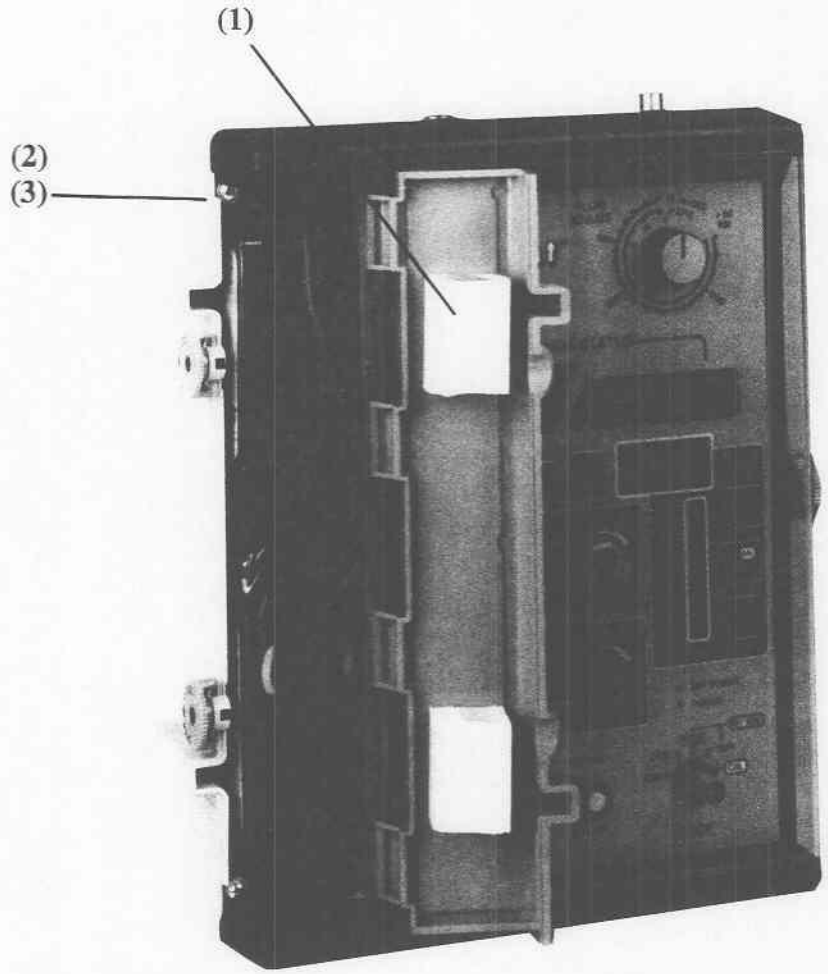
MANIFOLD ASSEMBLY
FLOW CONTROL VALVE ASSEMBLY
HARNESS ASSEMBLY

UPPER CASE ASSEMBLY

LOWER CASE ASSEMBLY

MEMBRANE PANEL ASSEMBLY
DISPLAY PRINTED CIRCUIT BOARD
CPU PRINTED CIRCUIT BOARD
TRANSDUCER PRINTED CIRCUIT BOARD
LINEAR REGULATORS BRACKET ASSEMBLY
LINEAR REGULATORS PRINTED CIRCUIT BOARD
POWER SUPPLY PRINTED CIRCUIT BOARD

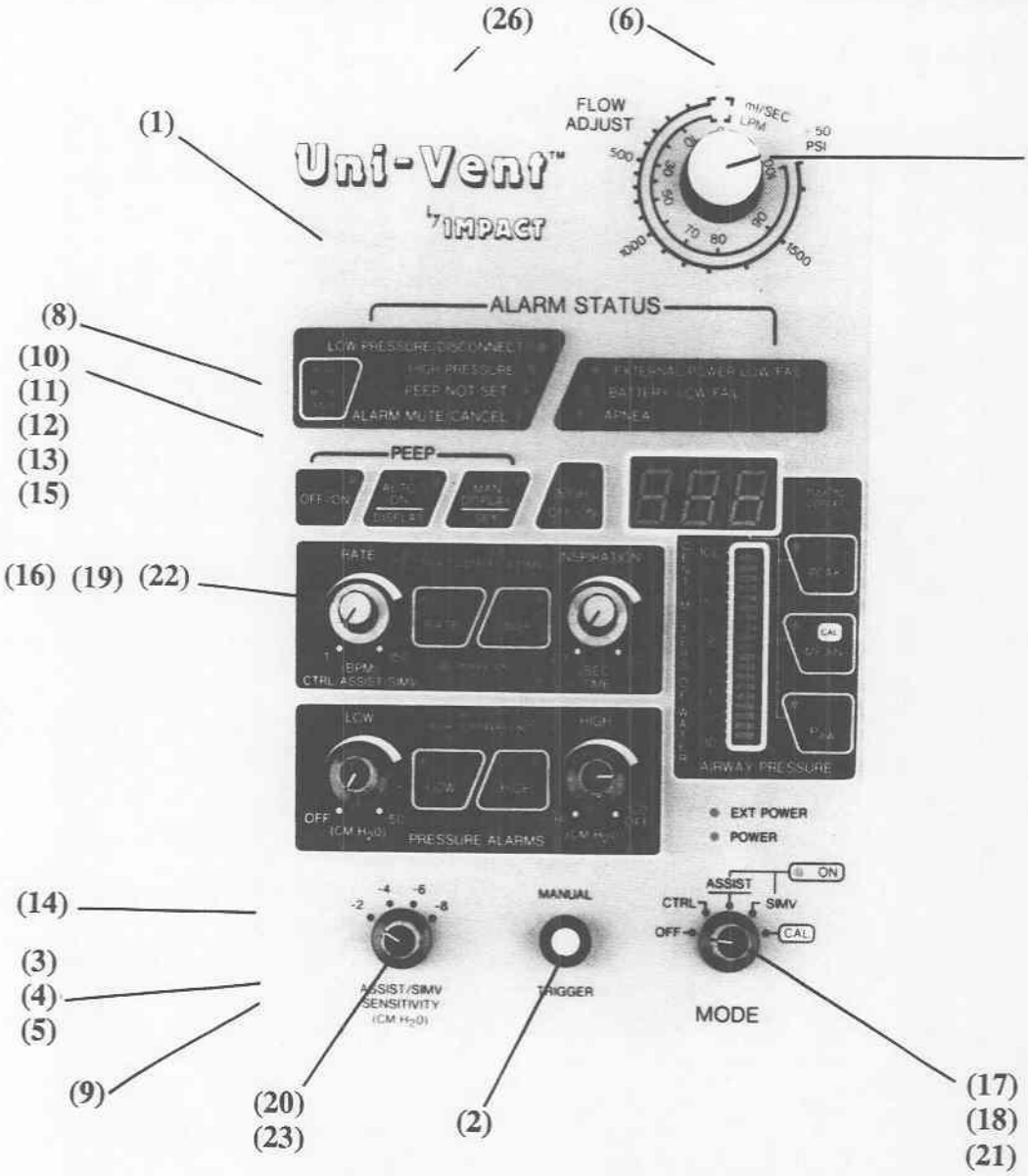
Figure 6. Composite Illustration Depicting Major Sub-Assemblies



#	Part Number	#	Part Number	#	Part Number
1	312-0041-00	2	358-0632-08	3	376-0007-00

See Bill of Material 701-0750-04 for complete Part Number Description.
(See Page 18 - 16)

Figure 7. Final Mechanical Assembly

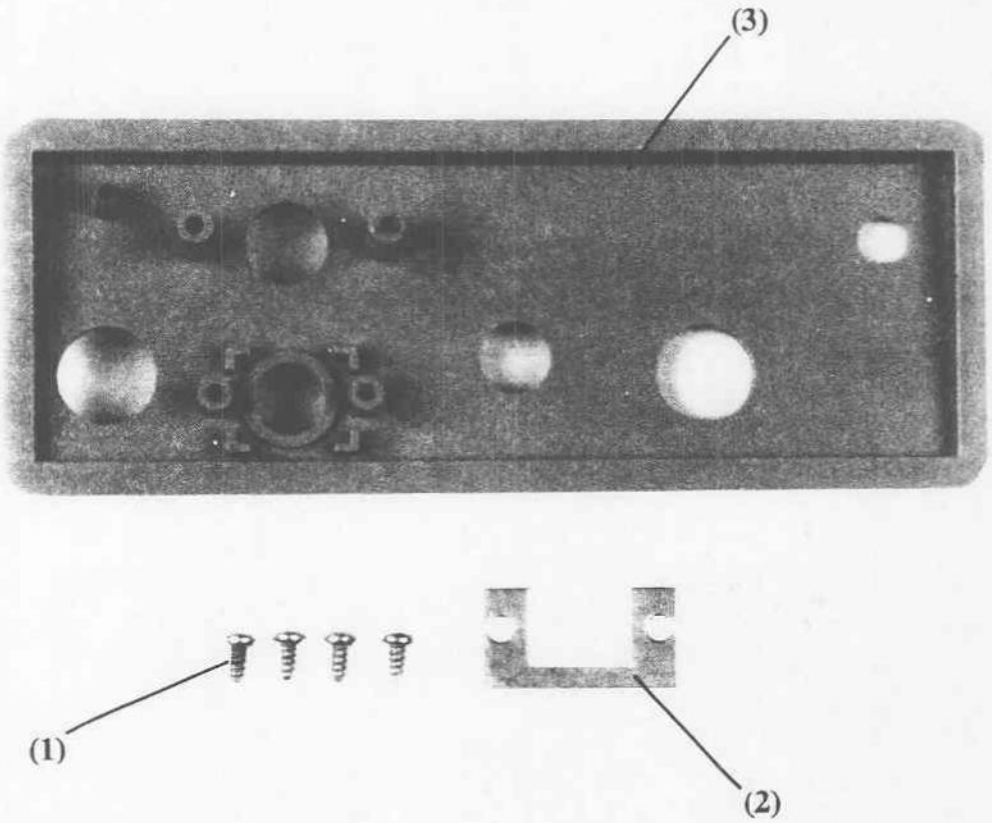


#	Part Number	#	Part Number	#	Part Number
1	130-0001-00	10	368-0010-00	19	392-0027-00
2	133-0001-00	11	368-0011-00	20	392-0028-00
3	310-0014-00	12	368-0013-00	21	392-0029-00
4	310-0017-00	13	368-0014-00	22	392-0030-00
5	346-0440-01	14	376-0008-00	23	392-0031-00
6	346-9618-00	15	376-0019-00	24	392-0032-00
7	348-0002-00	16	392-0024-00	25	392-0033-00
8	352-0440-04	17	392-0025-00	26	540-0083-00
9	368-0009-00	18	392-0026-00		

See Bill of Material 703-0750-09 for complete Part Number Description.

(See Page 18 - 26)

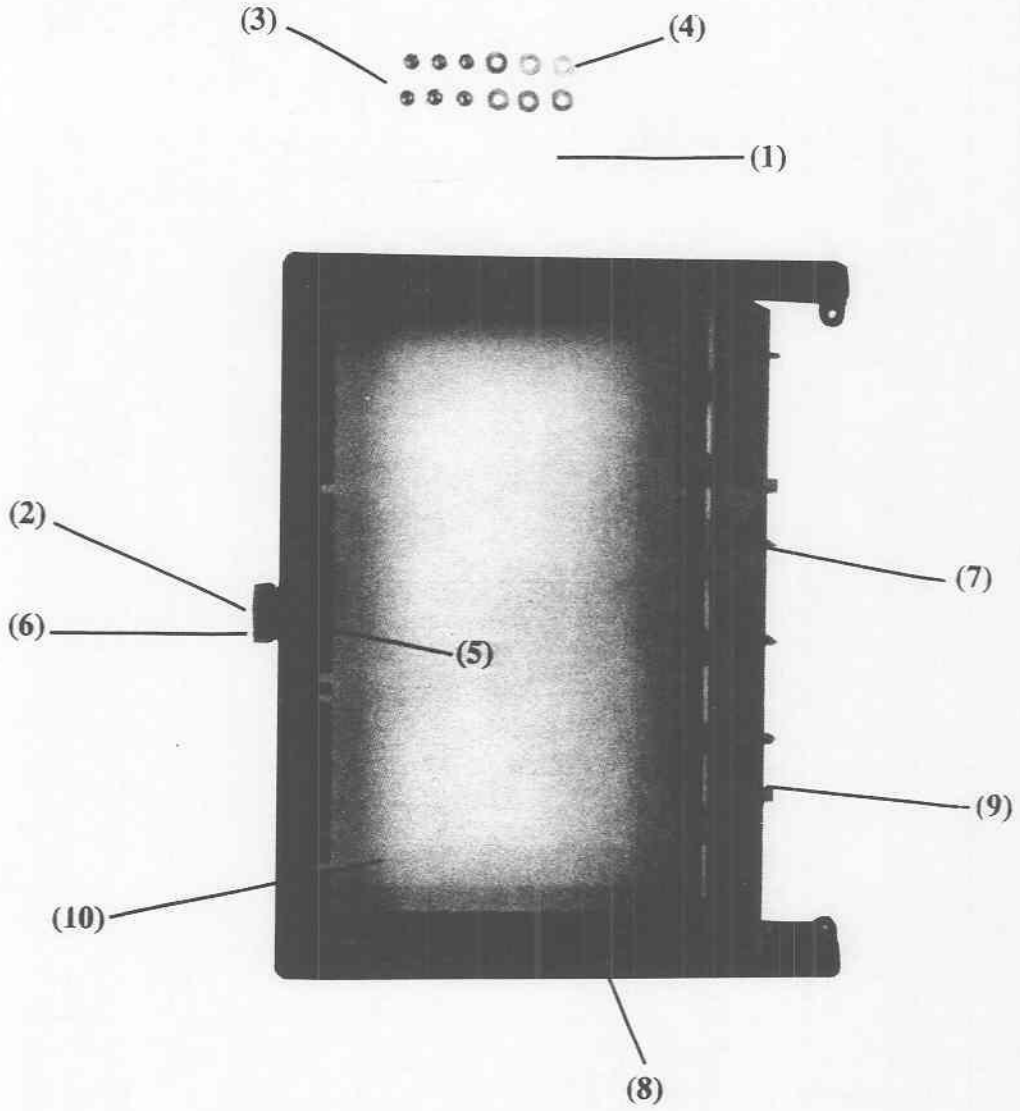
Figure 8. Membrane Panel Assembly



#	Part Number	#	Part Number	#	Part Number
1	366-0400-04	2	404-0750-21	3	422-0750-21

See Bill of Material 703-0750-09 for complete Part Number Description.
(See Page 18 - 26)

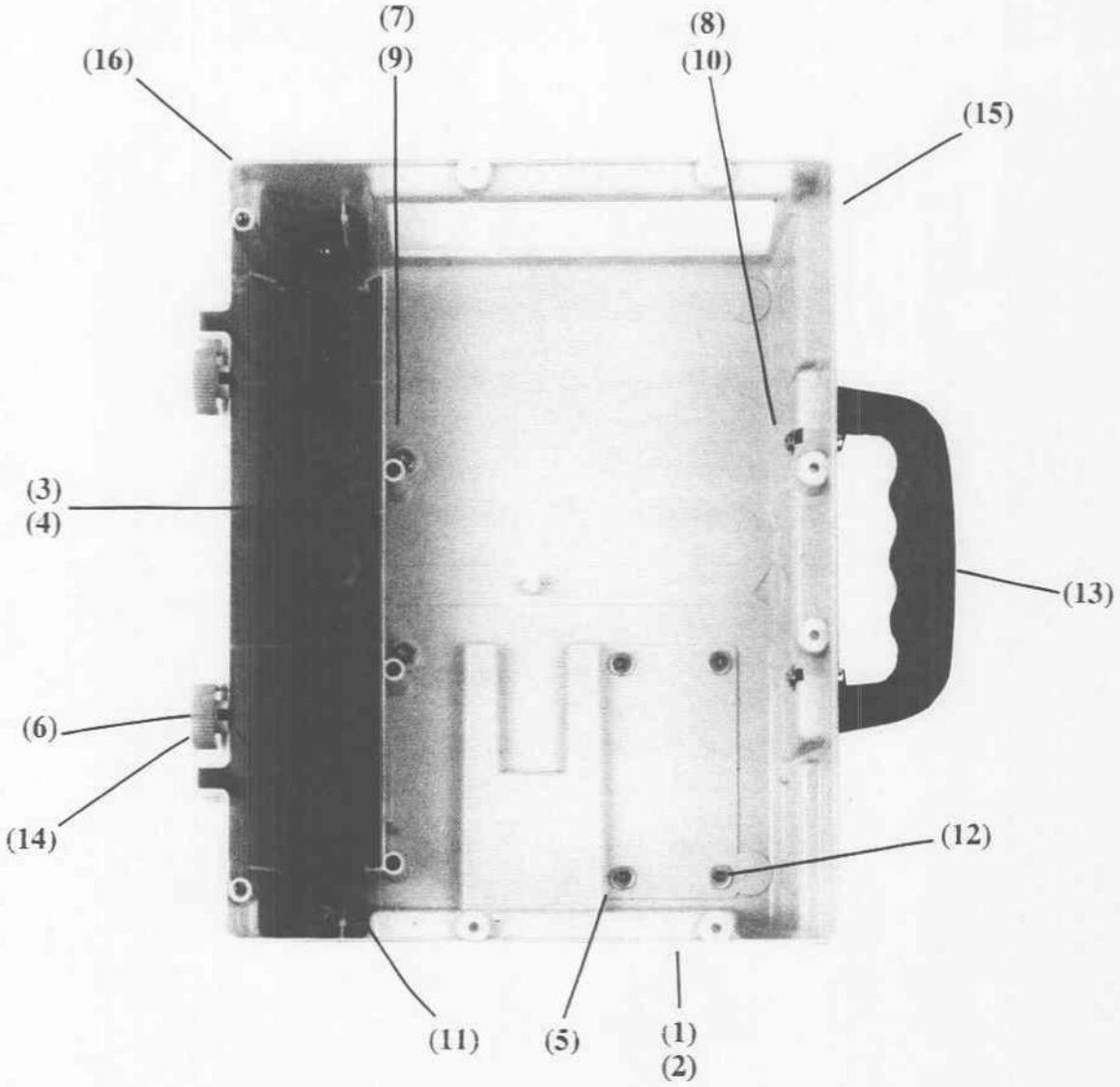
Figure 9. Connector Panel
(Part of Membrane Panel Assembly)



#	Part Number	#	Part Number	#	Part Number
1	305-0001-00	5	376-0008-00	8	416-0750-41
2	338-0007-00	6	392-0750-11	9	418-0750-31
3	346-0440-01	7	404-0750-91	10	418-0750-41
4	376-0007-00				

See Bill of Material 703-0750-11 for complete Part Number Description.
(See Page 18 - 28)

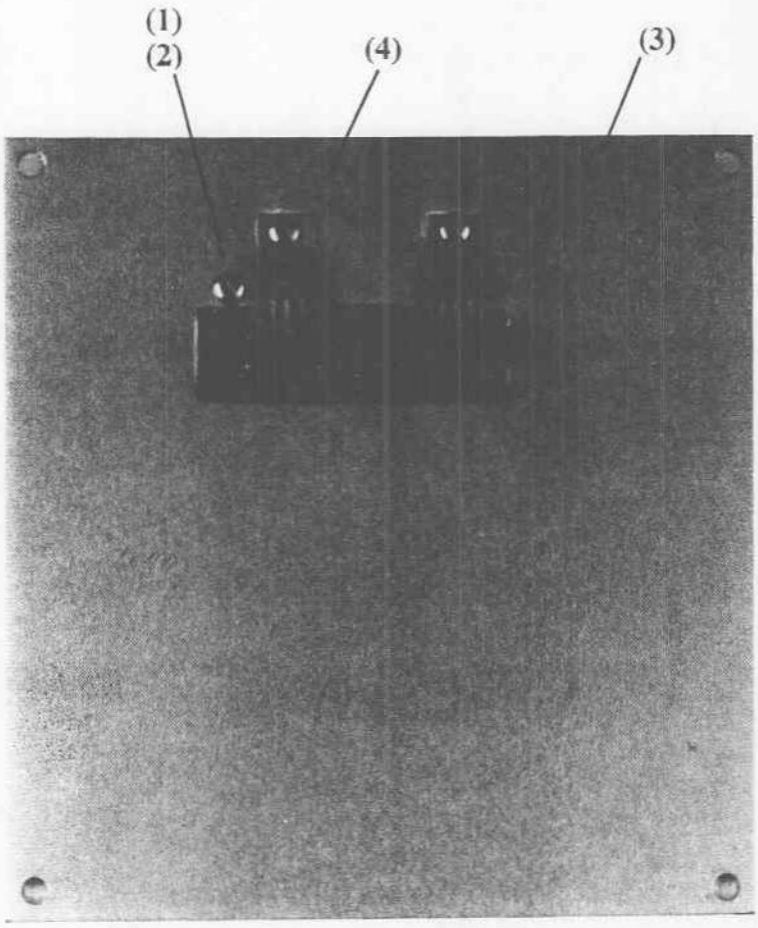
Figure 10. Upper Case Assembly



#	Part Number	#	Part Number	#	Part Number
1	325-0750-01	7	346-0632-01	13	390-0002-00
2	325-0750-03	8	356-0632-06	14	392-0750-11
3	334-0053-00	9	358-0632-08	15	416-0750-51
4	334-0054-00	10	376-0007-00	16	450-0008-00
5	338-0005-00	11	376-0008-00		
6	338-0007-00	12	376-0031-00		

See Bill of Material 703-0750-12 for complete Part Number Description.
(See Page 18 - 29)

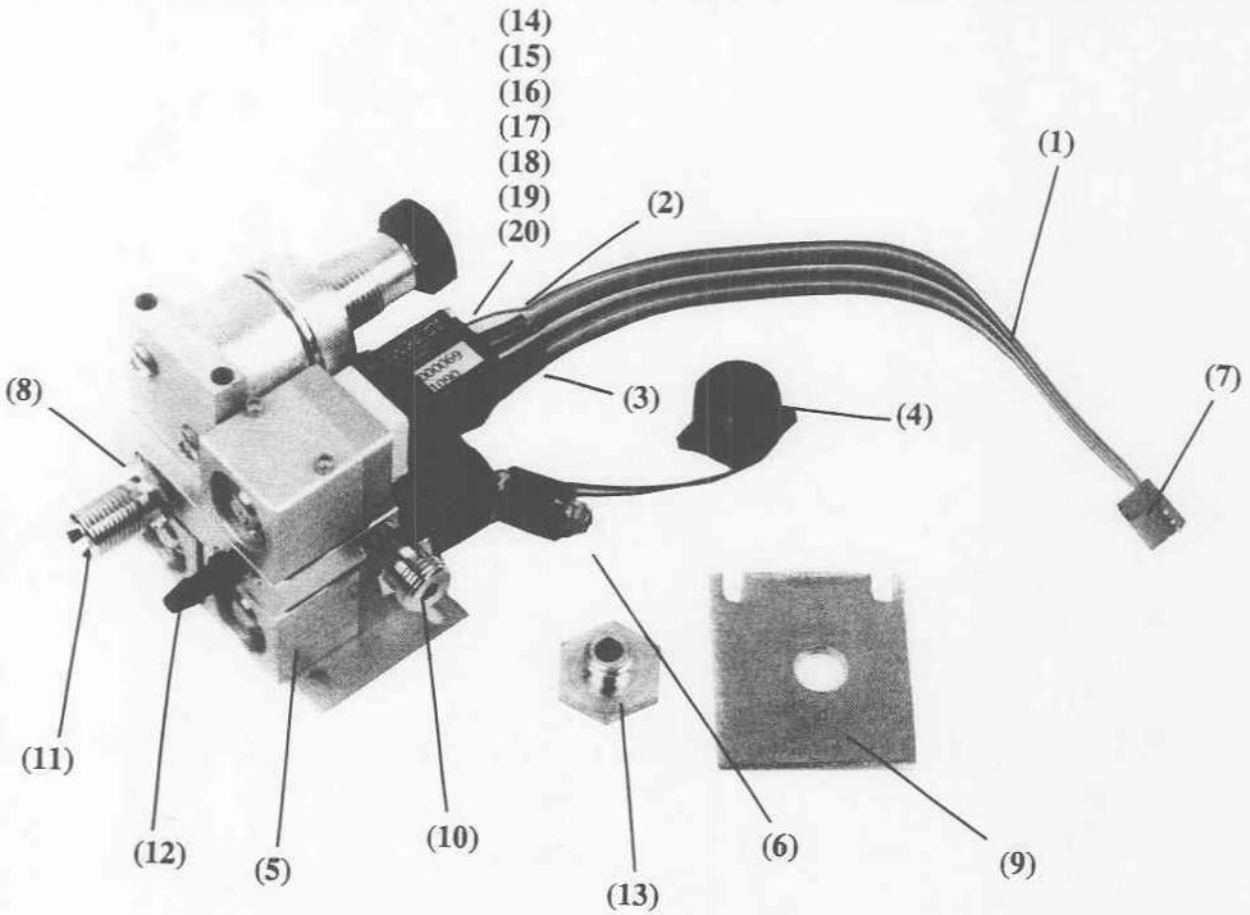
Figure 11. Lower Case Assembly



#	Part Number	#	Part Number	#	Part Number
1	346-0440-01	3	404-0750-101	4	606-0001-00
2	352-0440-04				

See Bill of Material 703-0750-13 for complete Part Number Description.
(See Page 18 - 30)

Figure 12. Linear Regulators Mounting Bracket Assembly

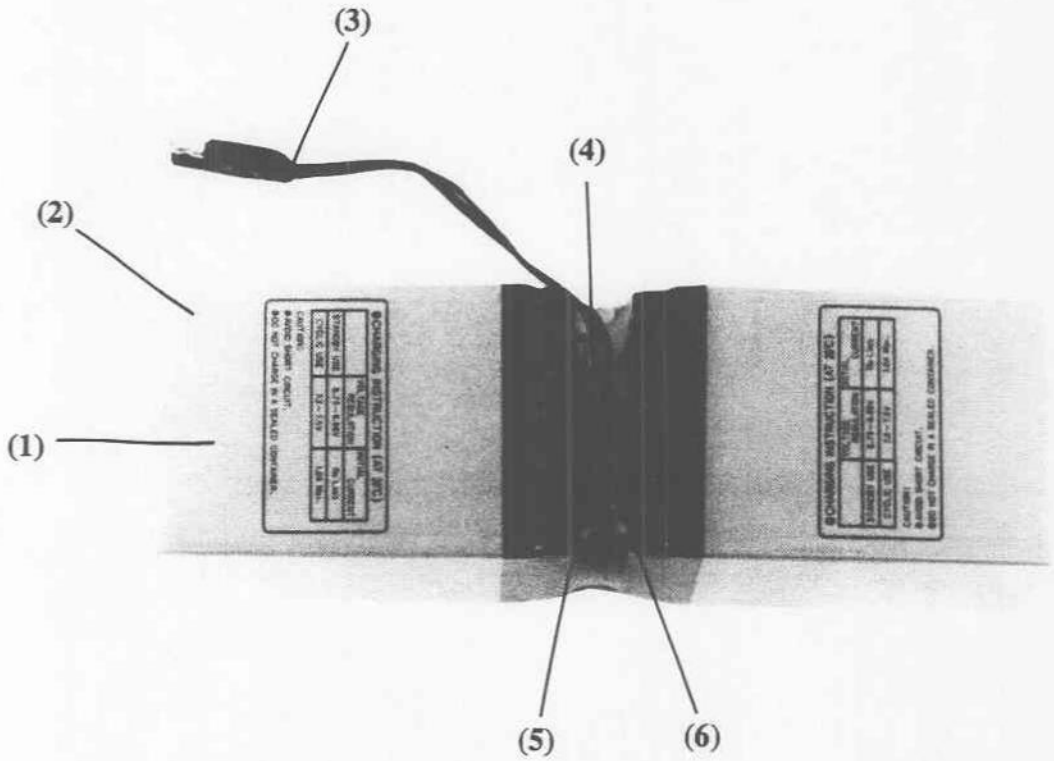


#	Part Number	#	Part Number	#	Part Number
1	010-0016-00	8	312-0021-00	15	700-0750-06
2	016-0004-00	9	404-0750-71	16	700-0750-15
3	016-0025-00	10	480-0141-00	17	700-0750-16
4	027-0009-00	11	480-0142-00	18	700-0750-17
5	033-0005-00	12	480-0144-00	19	700-0750-18
6	089-0016-00	13	490-0016-00	20	700-0750-19
7	100-0001-00	14	700-0750-01		

See Bill of Material 704-0750-01 for complete Part Number Description.

(See Page 18 - 31)

Figure 13. Manifold Assembly

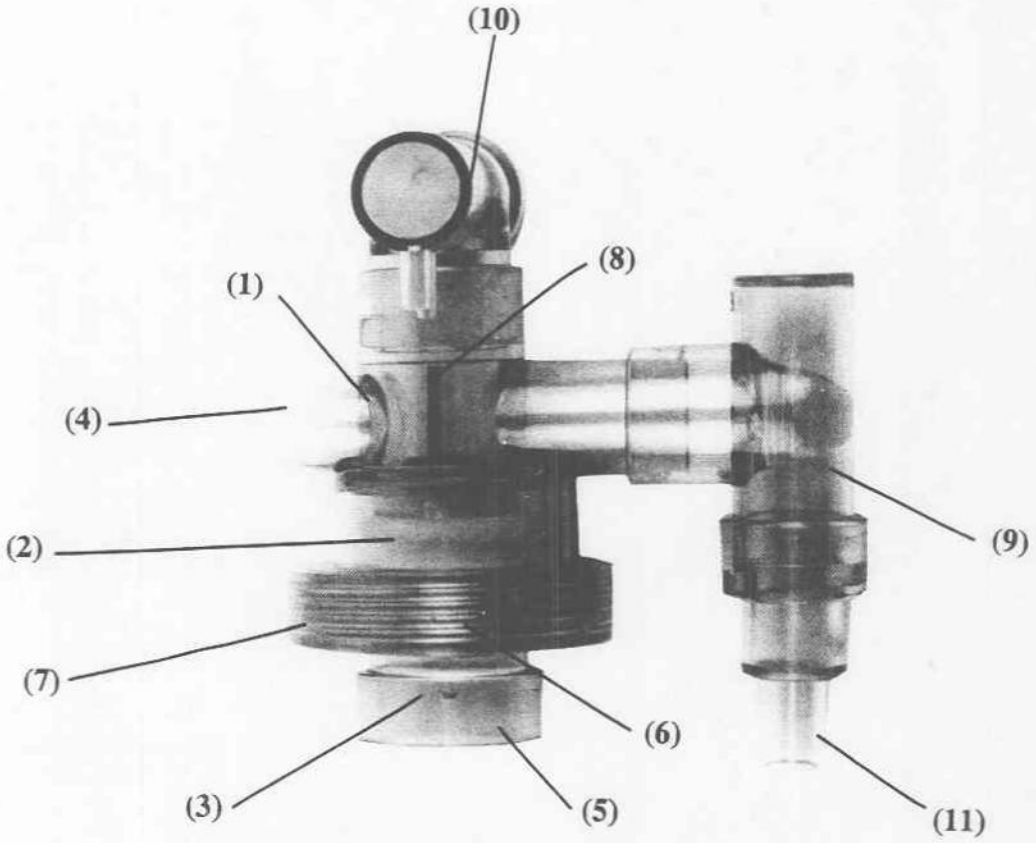


#	Part Number	#	Part Number	#	Part Number
1	016-0029-00	3	099-0009-02	5	600-0003-00
2	021-0016-00	4	310-0016-00	6	700-0750-11

See Bill of Material 704-0750-03 for complete Part Number Description.

(See Page 18 - 32)

Figure 14. Battery Pack Assembly

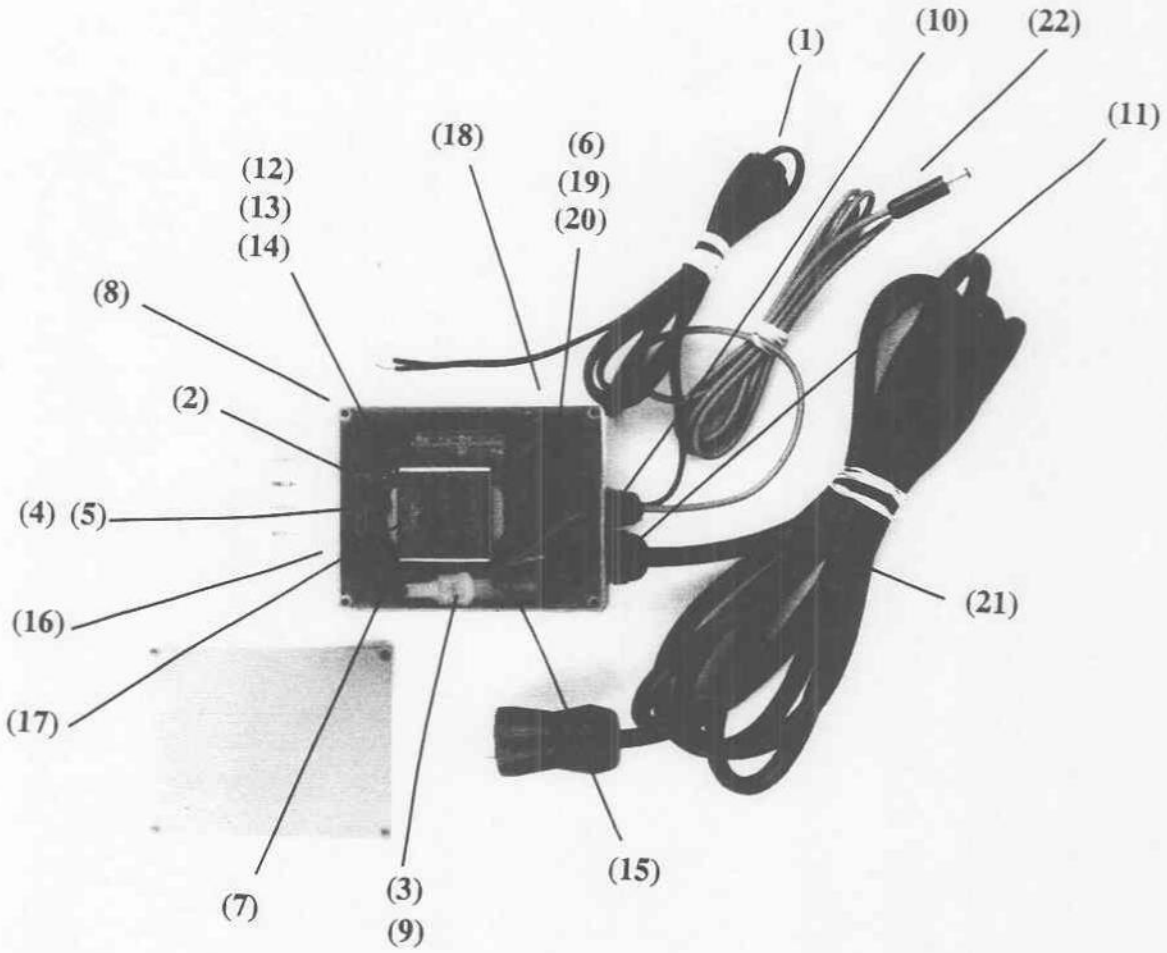


#	Part Number	#	Part Number	#	Part Number
1	490-0005-00	5	490-0021-00	9	490-0025-00
2	490-0006-00	6	490-0022-00	10	490-0026-00
3	490-0014-00	7	490-0023-00	11	490-0027-11
4	490-0020-00	8	490-0024-00		

See Bill of Material 704-0750-04 for complete Part Number Description.

(See Page 18 - 33)

Figure 15. Patient Valve Assembly

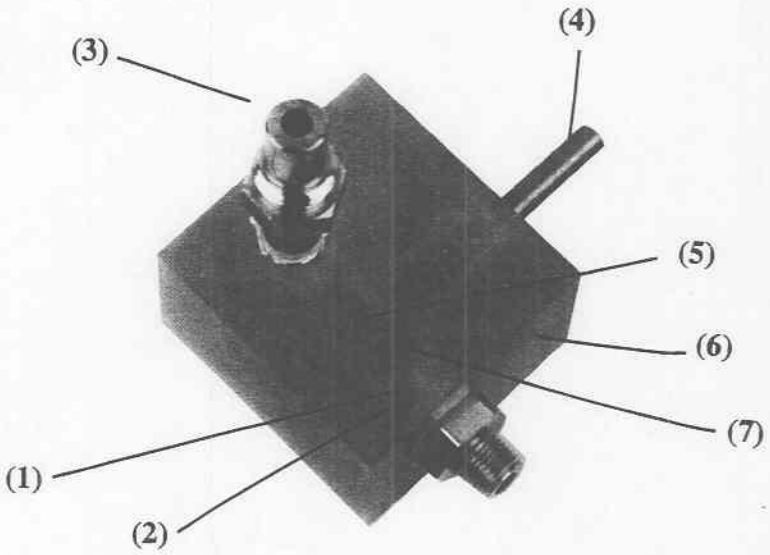


#	Part Number	#	Part Number	#	Part Number
1	002-0001-00	9	334-0034-00	17	404-0001-00
2	016-0004-00	10	340-0030-00	18	606-0001-00
3	081-0011-00	11	340-0031-00	19	700-0750-10
4	092-0007-00	12	346-0440-01	20	700-0750-12
5	100-0005-00	13	357-0440-10	21	708-0004-00
6	117-0013-00	14	368-0011-00	22	708-0750-01
7	312-0019-00	15	374-0017-00		
8	325-0750-04	16	402-0750-02		

See Bill of Material 704-0750-05 for complete Part Number Description.

(See Page 18 - 34)

Figure 16. AC Power Supply Assembly

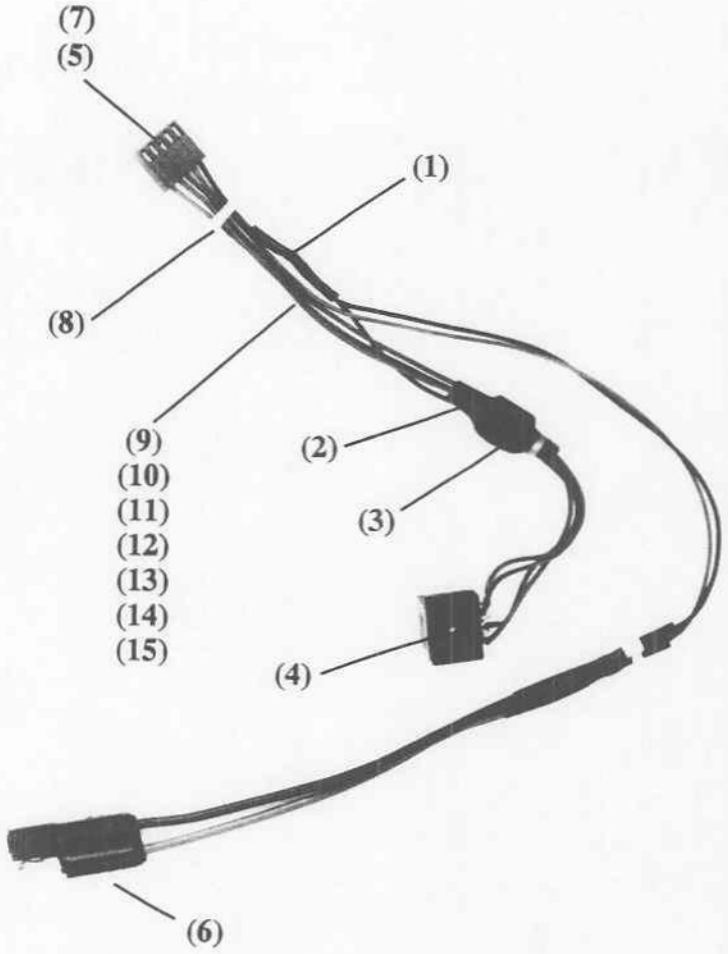


#	Part Number	#	Part Number	#	Part Number
1	376-0036-00	4	490-0015-11	7	540-0082-00
2	376-0037-00	5	490-0018-11		
3	480-0143-00	6	490-0019-11		

See Bill of Material 704-0750-06 for complete Part Number Description.

(See Page 18 - 35)

Figure 17. Flow Control Valve Assembly

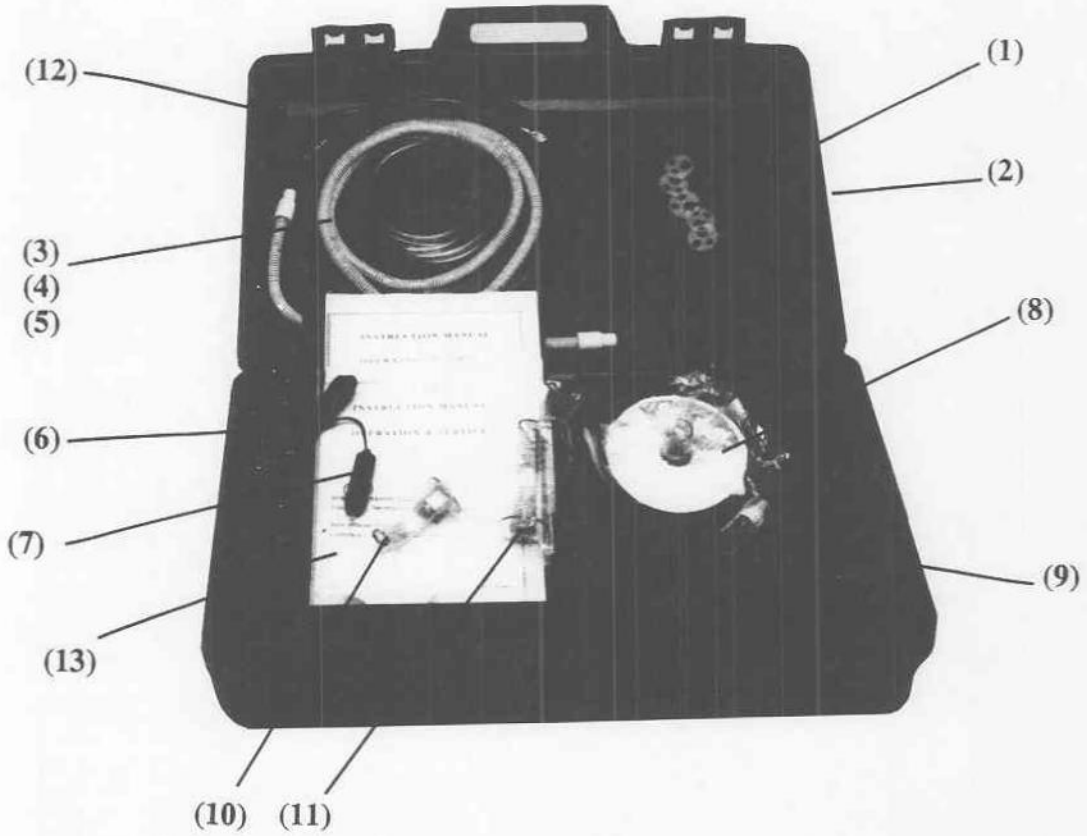


#	Part Number	#	Part Number	#	Part Number
1	016-0004-00	6	099-0010-12	11	700-0750-04
2	016-0025-00	7	100-0002-00	12	700-0750-05
3	031-0002-00	8	305-0001-00	13	700-0750-07
4	089-0011-00	9	700-0750-02	14	700-0750-08
5	092-0006-00	10	700-0750-03	15	700-0750-09

See Bill of Material 704-0750-10 for complete Part Number Description.

(See Page 18 - 36)

Figure 18. Harness Assembly



#	Part Number	#	Part Number	#	Part Number
1	334-0032-00	6	580-0750-01	11	820-0050-00
2	402-0005-00	7	708-0001-00	12	825-0006-00
3	540-0073-00	8	812-0004-00	13	906-0750-04
4	540-0075-00	9	820-0048-00		
5	540-0076-00	10	820-0049-00		

See Bill of Material 802-0750-10 for complete Part Number Description.

(See Page 18 - 37)

Figure 19. Accessory Kit Assembly

MASTER BILL OF MATERIALS, MODEL 750M, REV 0

B.O.M. #	REV	NOTES	QTY	PART NUMBER	DESCRIPTION
800-0750-02	0		0	800-0750-02	MASTER BILL OF MATERIALS
800-0750-02	0		1	701-0750-04	ASSEMBLY, FINAL ELECTRO/MECHANICAL, MODEL 750M
800-0750-02	0		1	702-0750-01	ASSEMBLY, DISPLAY PRINTED CIRCUIT BOARD
800-0750-02	0		1	702-0750-02	ASSEMBLY, CPU PRINTED CIRCUIT BOARD
800-0750-02	0		1	702-0750-04	ASSEMBLY, TRANSDUCER PRINTED CIRCUIT BOARD
800-0750-02	0		1	702-0750-05	ASSEMBLY, AC POWER SUPPLY PRINTED CIRCUIT BOARD
800-0750-02	0		1	702-0750-06	ASSEMBLY, LINEAR REGULATOR PRINTED CIRCUIT BOARD
800-0750-02	0		1	702-0750-07	ASSEMBLY, POWER SUPPLY PRINTED CIRCUIT BOARD (II)
800-0750-02	0		1	703-0750-09	ASSEMBLY, MEMBRANE PANEL
800-0750-02	0		1	703-0750-11	ASSEMBLY, CASE, UPPER, MODEL 750M
800-0750-02	0		1	703-0750-12	ASSEMBLY, CASE, LOWER, MODEL 750M
800-0750-02	0		1	703-0750-13	ASSEMBLY, BRACKET, LINEAR REGULATORS
800-0750-02	0		1	704-0750-01	ASSEMBLY, MANIFOLD
800-0750-02	0		1	704-0750-03	ASSEMBLY, BATTERY PACK, 4AH
800-0750-02	0		1	704-0750-04	ASSEMBLY, PATIENT VALVE
800-0750-02	0		1	704-0750-05	ASSEMBLY, AC POWER SUPPLY
800-0750-02	0		1	704-0750-06	ASSEMBLY, FLOW CONTROL VALVE
800-0750-02	0		1	704-0750-10	ASSEMBLY, HARNESS (I)
800-0750-02	0		1	802-0750-10	ASSY, ACC KIT, 750M, REUSE HOSES (W/DEMAND)

ASSEMBLY, FINAL ELECTRO/MECHANICAL - 750M, REV 0

B.O.M. #	REV	NOTES	QTY	PART NUMBER	DESCRIPTION
800-0750-02	0		0	800-0750-02	MASTER BILL OF MATERIALS
701-0750-04	0		2	312-0041-00	TAPE, FOAM, 3" X 1" X 1"
701-0750-04	0		8	358-0632-08	SCREW, PHILLIPS, PAN HEAD, 6-32 X 1/2
701-0750-04	0		2	376-0007-00	WASHER, FLAT, #6
701-0750-04	0		1	703-0750-11	ASSEMBLY, CASE, UPPER, MODEL 750M
701-0750-04	0		1	703-0750-12	ASSEMBLY, CASE, LOWER, MODEL 750M
701-0750-04	0		1	704-0750-03	ASSEMBLY, BATTERY PACK, 4AH

ASSEMBLY, DISPLAY PRINTED CIRCUIT BOARD, REV A

B.O.M. #	REV	NOTES	QTY	PART NUMBER	DESCRIPTION
800-0750-02	0		0	800-0750-02	MASTER BILL OF MATERIALS
702-0750-01	0		24	047-0914-00	DIODE, 1N914
702-0750-01	0		1	053-7424-00	IC, 74LS240
702-0750-01	0		1	053-7424-40	IC, 74LS244
702-0750-01	0		1	055-0324-00	IC, LM324N
702-0750-01	0		1	055-7218-00	IC, ICM7218AIJI
702-0750-01	0		1	067-0516-00	LED, 7-SEGMENT, GREEN, 1-DIGIT
702-0750-01	0		1	067-0526-00	LED, 7-SEGMENT, GREEN, 2-DIGIT
702-0750-01	0		2	067-2421-00	LED, BAR GRAPH, 10-SEGMENT, GREEN
702-0750-01	0		1	093-0005-20	HEADER, RIGHT ANGLE, SINGLE ROW, FEMALE, 20-PINS
702-0750-01	0		1	093-0008-40	HEADER, STRAIGHT, DUAL ROW, MALE, 20 X 2-PINS
702-0750-01	0		1	109-0001-00	SOCKET, IC, DIP, 14-PIN
702-0750-01	0		1	109-0003-00	SOCKET, IC, DIP, 28-PIN
702-0750-01	0		4	109-0011-00	SOCKET, IC, DIP, 20-PIN
702-0750-01	0		2	109-0014-00	SOCKET, STRIP, SIP, 20-PIN
702-0750-01	0		1	117-0014-00	SWITCH, ROTARY, 2-POLE, 4-POSITION
702-0750-01	0		1	117-0015-00	SWITCH, ROTARY, 2-POLE, 5-POSITION
702-0750-01	0		1	121-0006-00	SWITCH, PUSHBUTTON, SPDT (MOM), N.O., W/BUTTON
702-0750-01	0		4	200-0100-02	RESISTOR, CARBON FILM, 1/4W, 5%, 10 OHM
702-0750-01	0		4	200-0103-02	RESISTOR, CARBON FILM, 1/4W, 5%, 10K
702-0750-01	0		4	200-0241-02	RESISTOR, CARBON FILM, 1/4W, 5%, 240 OHM
702-0750-01	0		1	208-0103-01	RESISTOR, NETWORK, SIP, 1/8W, 2%, 10K
702-0750-01	0		4	214-0103-01	RESISTOR, VARIABLE, PM, 1/2W, 10K
702-0750-01	0		1	240-0750-01	DISPLAY, PRINTED CIRCUIT BOARD
702-0750-01	0		8	252-4766-11	CAPACITOR, ALUMINUM, ELECTROLYTIC, 47 UF, 10V

ASSEMBLY, DISPLAY PRINTED CIRCUIT BOARD, REV A

702-0750-01	0	12	259-1044-51	CAPACITOR, METALLIZED FILM, .1 UF, 50V

ASSEMBLY, CPU PRINTED CIRCUIT BOARD, REV B

B.O.M. #	REV	NOTES	QTY	PART NUMBER	DESCRIPTION
800-0750-02	0		0	800-0750-02	MASTER BILL OF MATERIALS
702-0750-02	0		8	047-0914-00	DIODE, 1N914
702-0750-02	0		4	047-4001-00	DIODE, 1N4001
702-0750-02	0		5	051-2222-00	TRANSISTOR, 2N2222
702-0750-02	0		1	053-7404-00	IC, 74LS04
702-0750-02	0		1	053-7408-00	IC, 74LS08
702-0750-02	0		1	053-7413-80	IC, 74LS13B
702-0750-02	0		1	053-7424-40	IC, 74LS244
702-0750-02	0		1	053-7432-00	IC, 74LS32
702-0750-02	0		2	053-7437-30	IC, 74LS373
702-0750-02	0		1	053-7474-00	IC, 74LS74
702-0750-02	0		1	054-4047-00	IC, CD4047
702-0750-02	0		1	054-4584-00	IC, CD4584
702-0750-02	0		1	055-0324-00	IC, LM324N
702-0750-02	0		1	055-0555-00	IC, LM555
702-0750-02	0		1	055-0809-00	IC, ADC8089CNN
702-0750-02	0		1	055-2725-60	IC, 27C256-25
702-0750-02	0		1	055-6116-20	IC, 6116N-20
702-0750-02	0		1	055-8031-00	IC, 8031
702-0750-02	0		1	055-9346-00	IC, NMC9346
702-0750-02	0		1	079-0001-00	CRYSTAL, 6MHZ
702-0750-02	0		1	093-0010-40	HEADER, STRAIGHT, DUAL ROW, FEMALE, 20 X 2-PINS
702-0750-02	0		1	093-0012-16	HEADER, STRAIGHT, DUAL ROW, MALE, 8 X 2-PINS
702-0750-02	0		1	093-0016-26	HEADER, STRAIGHT, DUAL ROW, MALE, 13 X 2-PINS
702-0750-02	0		7	109-0001-00	SOCKET, DIP, 14-PIN

ASSEMBLY, CPU PRINTED CIRCUIT BOARD, REV B

702-0750-02	0	1	109-0002-00	SOCKET, DIP, 16-PIN
702-0750-02	0	2	109-0003-00	SOCKET, DIP, 28-PIN
702-0750-02	0	2	109-0005-00	SOCKET, DIP, 8-PIN
702-0750-02	0	3	109-0011-00	SOCKET, DIP, 20-PIN
702-0750-02	0	1	109-0012-00	SOCKET, DIP, 24-PIN
702-0750-02	0	1	109-0013-00	SOCKET, DIP, 40-PIN
702-0750-02	0	3	200-0100-02	RESISTOR, CARBON FILM, 1/4W, 5%, 10 OHM
702-0750-02	0	1	200-0101-02	RESISTOR, CARBON FILM, 1/4W, 5%, 100 OHM
702-0750-02	0	5	200-0103-02	RESISTOR, CARBON FILM, 1/4W, 5%, 10K
702-0750-02	0	1	200-0104-02	RESISTOR, CARBON FILM, 1/4w, 5%, 100K
702-0750-02	0	1	200-0125-02	RESISTOR, CARBON FILM, 1/4W, 5%, 1.2M
702-0750-02	0	2	200-0152-02	RESISTOR, CARBON FILM, 1/4W, 5%, 1.5K
702-0750-02	0	1	200-0221-02	RESISTOR, CARBON FILM, 1/4W, 5%, 220 OHM
702-0750-02	0	3	200-0302-02	RESISTOR, CARBON FILM, 1/4W, 5%, 3K
702-0750-02	0	1	200-0394-02	RESISTOR, CARBON FILM, 1/4W, 5%, 390K
702-0750-02	0	3	200-0563-02	RESISTOR, CARBON FILM, 1/4W, 5%, 56K
702-0750-02	0	1	200-0682-02	RESISTOR, CARBON FILM, 1/4W, 5%, 6.8K
702-0750-02	0	3	213-2003-00	RESISTOR, METAL FILM, 1/4W, 1%, 200K
702-0750-02	0	3	213-7872-00	RESISTOR, METAL FILM, 1/4W, 1%, 78.7K
702-0750-02	0	1	240-0750-02	CPU PRINTED CIRCUIT BOARD
702-0750-02	0	4	252-1066-31	CAPACITOR, ALUMINUM, ELECTROLYTIC, 10 UF, 25V
702-0750-02	0	1	252-4756-41	CAPACITOR, ALUMINUM, ELECTROLYTIC, 4.7 UF, 35V
702-0750-02	0	1	252-4766-11	CAPACITOR, ALUMINUM, ELECTROLYTIC, 47 UF, 10V
702-0750-02	0	2	258-1024-12	CAPACITOR, POLYESTER, .001 UF, 100V
702-0750-02	0	1	258-3324-12	CAPACITOR, POLYESTER, .0033 UF, 100V
702-0750-02	0	21	259-1044-51	CAPACITOR, METALLIZED FILM, .1 UF, 50V
702-0750-02	0	2	266-3303-12	CAPACITOR, CERAMIC, DISC, 33 PF, 100V

ASSEMBLY, AC POWER SUPPLY PRINTED CIRCUIT BOARD, REV 0

B.O.M. #	REV	NOTES	QTY	PART NUMBER	DESCRIPTION
800-0750-02	0		0	800-0750-02	MASTER BILL OF MATERIALS
702-0750-05	0		1	023-0016-00	TRANSFORMER, POWER
702-0750-05	0		2	047-0331-00	DIODE, BRIDGE RECTIFIER
702-0750-05	0		1	055-7812-00	REGULATOR, 12VDC OUTPUT
702-0750-05	0		1	093-0019-07	HEADER, 7-PIN, .156 CENTERS
702-0750-05	0		1	240-0750-05	AC POWER SUPPLY PRINTED CIRCUIT BOARD
702-0750-05	0		1	252-4786-31	CAPACITOR, ALUM, ELECT, 4700 UF, 25V
702-0750-05	0		4	257-1044-51	CAPACITOR, MYLAR, .1 UF, 10%, 50V
702-0750-05	0		1	305-0002-00	CABLE TIE, 5 1/2" LONG

ASSEMBLY, LINEAR REGULATORS PRINTED CIRCUIT BOARD, REV 0

B.O.M. #	REV	NOTES	QTY	PART NUMBER	DESCRIPTION
800-0750-02	0		0	800-0750-02	MASTER BILL OF MATERIALS
702-0750-06	0		1	055-7805-00	REGULATOR, 5VDC
702-0750-06	0		1	055-7808-00	REGULATOR, 8VDC
702-0750-06	0		1	093-0021-05	HEADER, 5-PIN, MALE
702-0750-06	0		1	240-0750-06	LINEAR REGULATORS PRINTED CIRCUIT BOARD
702-0750-06	0		4	257-1044-51	CAPACITOR, MYLAR, .1 UF, 10%, 50V
702-0750-06	0			ASRQ602-0001-00	SEALANT, SILICONE RUBBER, RTV

ASSEMBLY, POWER SUPPLY (II) PRINTED CIRCUIT BOARD, REV B

B.O.M. #	REV	NOTES	QTY	PART NUMBER	DESCRIPTION
800-0750-02	0		0	800-0750-02	MASTER BILL OF MATERIALS
702-0750-07	0		1	029-0002-00	INDUCTOR, 560 UH
702-0750-07	0		3	047-0914-00	DIODE, 1N914
702-0750-07	0		2	047-4001-00	DIODE, 1N4001
702-0750-07	0	*	1	047-5819-00	DIODE, IN5819 (TYPE II)
702-0750-07	0	*	2	047-5822-00	DIODE, IN5822 (TYPE II)
702-0750-07	0		1	049-4733-10	DIODE, ZENER, 1N4733A, 5.1V
702-0750-07	0	*	1	051-0452-00	TRANSISTOR, D45H2, PNP (TYPE II)
702-0750-07	0		1	055-0274-00	IC, TLC274ACN, QUAD OP-AMP
702-0750-07	0		1	055-0324-00	IC, LM324N, QUAD OP-AMP
702-0750-07	0		1	055-0336-00	IC, LM336, VOLTAGE REFERENCE, 2.5V
702-0750-07	0		1	055-0339-00	IC, LM339N, QUAD VOLTAGE COMPARATOR
702-0750-07	0		2	055-0385-12	IC, LM385, VOLTAGE REFERENCE, 1.2V
702-0750-07	0	*	1	055-3578-00	IC, LM3578, SWITCHING REGULATOR (TYPE II)
702-0750-07	0		1	055-7660-00	IC, ICL7660, VOLTAGE CONVERTER
702-0750-07	0		1	055-7806-00	IC, 7806T, +6V VOLTAGE REGULATOR
702-0750-07	0		1	081-0009-00	FUSE, 1A
702-0750-07	0		1	093-0013-05	HEADER, RT ANGLE, FRICTION LOCK, 5-PINS
702-0750-07	0		1	093-0014-26	HEADER, STRAIGHT, DUAL ROW, FEMALE, 13 X 2-PINS
702-0750-07	0		1	093-0015-10	HEADER, RT ANGLE, SINGLE ROW, MALE, 10 PINS
702-0750-07	0	*	1	093-0023-05	HEADER, STR, SINGLE ROW, FEMALE, 5-PINS (TYPE II)
702-0750-07	0		3	109-0001-00	SOCKET, IC, DIP, 14-PIN
702-0750-07	0	*	2	109-0005-00	SOCKET, IC, DIP, 8-PIN (TYPE II)
702-0750-07	0		1	200-0100-02	RESISTOR, CARBON FILM, 1/4W, 5%, 10 OHM
702-0750-07	0		1	200-0111-02	RESISTOR, CARBON FILM, 1/4W, 5%, 110 OHM

ASSEMBLY, POWER SUPPLY (II) PRINTED CIRCUIT BOARD, REV B

702-0750-07	0		2	200-0155-02	RESISTOR, CARBON FILM, 1/4W, 5%, 1.5M
702-0750-07	0		1	200-0202-02	RESISTOR, CARBON FILM, 1/4W, 5%, 2K
702-0750-07	0		1	200-0224-02	RESISTOR, CARBON FILM, 1/4W, 5%, 220K
702-0750-07	0		1	200-0432-02	RESISTOR, CARBON FILM, 1/4W, 5%, 4.3K
702-0750-07	0	*	1	200-0471-02	RESISTOR, CARBON FILM, 1/4W, 5%, 470 OHM (TYPE II)
702-0750-07	0		1	200-0512-02	RESISTOR, CARBON FILM, 1/4W, 5%, 5.1K
702-0750-07	0		1	200-0513-02	RESISTOR, CARBON FILM, 1/4W, 5%, 51K
702-0750-07	0		2	201-0106-02	RESISTOR, HI-REL, CARBON FILM, 1/4W, 5%, 10M
702-0750-07	0		1	202-0751-02	RESISTOR, CARBON FILM, 1/2W, 5%, 750 OHM
702-0750-07	0		1	204-0010-02	RESISTOR, METAL OXIDE FILM, 1W, 5%, 1 OHM
702-0750-07	0	*	1	204-051X-02	RESISTOR, METAL OXIDE, 1W, 5%, 0.51 OHM (TYPE II)
702-0750-07	0		1	210-0020-00	RESISTOR, WIREWOUND, 5W, 5%, 2 OHM
702-0750-07	0		2	213-1002-00	RESISTOR, METAL FILM, 1/4W, 1%, 10K
702-0750-07	0		4	213-1003-00	RESISTOR, METAL FILM, 1/4W, 1%, 100K
702-0750-07	0		2	213-1103-00	RESISTOR, METAL FILM, 1/4W, 1%, 110K
702-0750-07	0		1	213-1213-00	RESISTOR, METAL FILM, 1/4W, 1%, 121K
702-0750-07	0		1	213-1241-00	RESISTOR, METAL FILM, 1/4W, 1%, 1.24K
702-0750-07	0		1	213-1333-00	RESISTOR, METAL FILM, 1/4W, 1%, 133K
702-0750-07	0		1	213-2432-00	RESISTOR, METAL FILM, 1/4W, 1%, 24.3K
702-0750-07	0		1	213-3922-00	RESISTOR, METAL FILM, 1/4W, 1%, 39.2K
702-0750-07	0		1	213-4121-00	RESISTOR, METAL FILM, 1/4W, 1%, 4.12K
702-0750-07	0		2	213-4223-00	RESISTOR, METAL FILM, 1/4W, 1%, 422K
702-0750-07	0	*	1	213-7501-00	RESISTOR, METAL FILM, 1/4W, 1%, 7.5K (TYPE II)
702-0750-07	0		2	213-9091-00	RESISTOR, METAL FILM, 1/4W, 1%, 9.09K
702-0750-07	0		1	216-0103-00	RESISTOR, VARIABLE, VERTICAL MOUNTING, TRIM, 10K
702-0750-07	0		1	240-0750-03	POWER SUPPLY, PRINTED CIRCUIT BOARD
702-0750-07	0		1	240-0750-04	TRANSDUCER, PRINTED CIRCUIT BOARD
702-0750-07	0		2	252-1056-61	CAPACITOR, ALUMINUM, ELECTROLYTIC, 1 UF, 63V

ASSEMBLY, POWER SUPPLY (II) PRINTED CIRCUIT BOARD, REV B

702-0750-07	0	*	1	252-1066-31	CAPACITOR, ALUM, ELECT, 10 UF, 25V (TYPE II)
702-0750-07	0		2	252-4766-11	CAPACITOR, ALUMINUM, ELECTROLYTIC, 47 UF, 10V
702-0750-07	0		1	252-4776-11	CAPACITOR, ALUMINUM, ELECTROLYTIC, 470 UF, 10V
702-0750-07	0		1	252-4776-21	CAPACITOR, ALUMINUM, ELECTROLYTIC, 470 UF, 16V
702-0750-07	0		4	252-4776-31	CAPACITOR, ALUMINUM, ELECTROLYTIC, 470 UF, 25V
702-0750-07	0		1	252-4776-51	CAPACITOR, ALUMINUM, ELECTROLYTIC, 470 UF, 50V
702-0750-07	0		2	258-1024-12	CAPACITOR, POLYESTER, .001 UF, 100V
702-0750-07	0	*	1	258-1824-12	CAPACITOR, POLYESTER, .0018 UF, 100V (TYPE II)
702-0750-07	0		2	258-1834-12	CAPACITOR, POLYESTER, .018 UF, 100V
702-0750-07	0		1	258-2224-12	CAPACITOR, POLYESTER, .0022 UF, 100V
702-0750-07	0	*	7	259-1044-51	CAPACITOR, METALLIZED FILM, .1 UF, 50V (TYPE II)
702-0750-07	0		1	259-1054-51	CAPACITOR, METALLIZED FILM, 1 UF, 50V
702-0750-07	0	*	1	266-2203-12	CAPACITOR, CERAMIC DISC, 22 PF, 100V (TYPE II)
702-0750-07	0		1	310-0013-00	HEAT SINK
702-0750-07	0		2	334-0052-00	FUSEHOLDER
702-0750-07	0		2	346-0440-05	NUT, HEX, NYLON, 4-40
702-0750-07	0		2	352-0440-06	SCREW, PHILLIPS, PAN HEAD, 4-40 X 3/8
702-0750-07	0			ASRQ606-0001-00	SILICON GREASE
702-0750-07	0	*	1	700-0750-13	JUMPER, YELLOW, 1" LONG (TYPE II)
702-0750-07	0	*	1	700-0750-14	JUMPER, YELLOW, 1" LONG (TYPE II)
702-0750-07	0		1	804-0001-00	TRANSDUCER, PRESSURE

ASSEMBLY, MEMBRANE PANEL, REV 0

B.O.M. #	REV	NOTES	QTY	PART NUMBER	DESCRIPTION
800-0750-02	0		0	800-0750-02	MASTER BILL OF MATERIALS
703-0750-09	0		1	130-0001-00	PANEL, MEMBRANE
703-0750-09	0		1	133-0001-00	GUARD, SWITCH, BLACK
703-0750-09	0		1	310-0014-00	SHIELD, ALUMINUM, EMI
703-0750-09	0		1	310-0017-00	INSULATOR, MYLAR, P/S, #4 X .50 O.D. X .031 THK
703-0750-09	0		5	346-0440-01	NUT, KEPS, 4-40
703-0750-09	0		2	346-9618-00	NUT, HEX, CHROME, 9/16-18
703-0750-09	0		1	348-0002-00	PIN, STOP, KNOB
703-0750-09	0		8	352-0440-04	SCREW, SLOTTED, BIND HEAD, 4-40 X 1/4
703-0750-09	0		4	366-0400-04	SCREW, PHILLIPS, SELF-TAPPING, #4 X 1/4
703-0750-09	0	*	8	368-0009-00	SPACER, HEX, THDD, M/F, 4-40 X 5/8 LONG (TYPE II)
703-0750-09	0		6	368-0010-00	SPACER, HEX, THREADED, F/F, 4-40 X 5/8 LONG
703-0750-09	0		4	368-0011-00	SPACER, NYLON, #4 I.D. X .25 O.D. X .25 LONG
703-0750-09	0		4	368-0013-00	SPACER, NYLON, #4 I.D. X .25 O.D. X 9/16 LONG
703-0750-09	0		4	368-0014-00	SPACER, HEX, THREADED, M/F, 4-40 X 1/4 LONG
703-0750-09	0		6	376-0008-00	WASHER, FLAT, #4
703-0750-09	0		4	376-0019-00	WASHER, LOCK, INTERNAL TOOTH, #4
703-0750-09	0		2	392-0024-00	KNOB, COLLET, BLACK, W/IND, 1/8" SHAFT
703-0750-09	0		4	392-0025-00	KNOB, COLLET, GRAY, W/IND, 1/8" SHAFT
703-0750-09	0		2	392-0026-00	CAP, COLLET KNOB, W/IND, BLACK
703-0750-09	0		2	392-0027-00	CAP, COLLET KNOB, W/IND, GRAY
703-0750-09	0		2	392-0028-00	CAP, COLLET KNOB, W/IND, RED
703-0750-09	0		2	392-0029-00	NUT COVER, COLLET KNOB, BLACK
703-0750-09	0		2	392-0030-00	NUT COVER, COLLET KNOB, GRAY
703-0750-09	0		2	392-0031-00	NUT COVER, COLLET KNOB, RED

ASSEMBLY, MEMBRANE PANEL, REV 0

703-0750-09	0		1	392-0032-00	KNOB, COLLET, BLACK, W/IND, 1/4" SHAFT
703-0750-09	0		1	392-0033-00	CAP, COLLET KNOB, W/IND, GRAY
703-0750-09	0		1	404-0750-21	BRACKET, POWER JACK
703-0750-09	0	*	1	416-0019-00	CAP, HOLE PLUG, .437 DIA. (NON-DEMAND UNITS ONLY)
703-0750-09	0		1	422-0750-21	PANEL, CONNECTOR (PART OF 402-0750-03)
703-0750-09	0		1	540-0083-00	TUBE, 1/8" I.D. X 1/4" O.D. X 8" LONG
703-0750-09	0		1	702-0750-01	ASSEMBLY, DISPLAY PRINTED CIRCUIT BOARD
703-0750-09	0		1	702-0750-02	ASSEMBLY, CPU, PRINTED CIRCUIT BOARD
703-0750-09	0		1	702-0750-07	ASSEMBLY, POWER SUPPLY, PRINTED CIRCUIT BOARD
703-0750-09	0	*	1	703-0750-07	ASSEMBLY, BRACKET, LINEAR REGULATORS (TYPE II)
703-0750-09	0		1	704-0750-01	ASSEMBLY, MANIFOLD

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ASSEMBLY, UPPER CASE - 750M, REV 0

B.O.M. #	REV	NOTES	QTY	PART NUMBER	DESCRIPTION
800-0750-02	0		0	800-0750-02	MASTER BILL OF MATERIALS
703-0750-11	0		1	305-0001-00	CABLE TIE, MINIATURE
703-0750-11	0		1	338-0007-00	RIVET (PART OF 402-0750-03)
703-0750-11	0		6	346-0440-01	NUT, KEPS, 4-40
703-0750-11	0		6	376-0007-00	WASHER, FLAT, #6
703-0750-11	0		1	376-0008-00	WASHER, FLAT, #4 (PART OF 402-0750-03)
703-0750-11	0		1	392-0750-11	KNOB (PART OF 402-0750-03)
703-0750-11	0		1	404-0750-91	BRACKET, BATT COMP DIVIDER (PART OF 402-0750-03)
703-0750-11	0		1	416-0750-41	COVER, TOP (PART OF 402-0750-03)
703-0750-11	0		1	418-0750-31	DOOR, BATTERY COMPARTMENT (PART OF 402-0750-03)
703-0750-11	0		1	418-0750-41	DOOR, TOP COVER (PART OF 402-0750-03)
703-0750-11	0		1	703-0750-09	ASSEMBLY, MEMBRANE PANEL

ASSEMBLY, LOWER CASE - 750M, REV 0

B.O.M. #	REV	NOTES	QTY	PART NUMBER	DESCRIPTION
800-0750-02	0		0	800-0750-02	MASTER BILL OF MATERIALS
703-0750-12	0		1	325-0750-01	LABEL, P/S, COND OP INSTR & TIDAL VOLUME
703-0750-12	0		1	325-0750-03	LABEL, I.D., MILITARY
703-0750-12	0		1	334-0053-00	STRAP, VELCRO, LOOP W/D-RING
703-0750-12	0		1	334-0054-00	STRAP, VELCRO, LOOP/HOOK
703-0750-12	0		4	338-0005-00	RIVET, POP, #4
703-0750-12	0		2	338-0007-00	RIVET (PART OF 402-0750-03)
703-0750-12	0		2	346-0632-01	NUT, KEPS, 6-32
703-0750-12	0		4	356-0632-06	SCREW, PH, BH, 6-32 X 3/8 (PART OF 402-0750-03)
703-0750-12	0		2	358-0632-08	SCREW, PHILLIPS, PAN HEAD, 6-32 X 1/2
703-0750-12	0		4	376-0007-00	WASHER, FLAT, #6 (PART OF 402-0750-03)
703-0750-12	0		2	376-0008-00	WASHER, FLAT, #4 (PART OF 402-0750-03)
703-0750-12	0		4	376-0031-00	WASHER, FLAT, ALUMINUM, 1/8" I.D.
703-0750-12	0		1	390-0002-00	HANDLE (PART OF 402-0750-03)
703-0750-12	0		2	392-0750-11	KNOB (PART OF 402-0750-03)
703-0750-12	0		1	416-0750-51	COVER, BOTTOM (PART OF 402-0750-03)
703-0750-12	0		4	450-0008-00	BUMPER, FOOT, P/S

ASSEMBLY, LINEAR REGULATORS MOUNTING BRACKET, REV 0

B.O.M. #	REV	NOTES	QTY	PART NUMBER	DESCRIPTION
800-0750-02	0		0	800-0750-02	MASTER BILL OF MATERIALS
703-0750-13	0		3	346-0440-01	NUT, KEPS, 4-40
703-0750-13	0		3	352-0440-04	SCREW, SLOTTED BIND HEAD, 4-40 X 1/4
703-0750-13	0		1	404-0750-101	BRACKET, LINEAR REGULATORS
703-0750-13	0			ASRQ606-0001-00	SILICON GREASE
703-0750-13	0		1	702-0750-06	ASSEMBLY, LINEAR REGULATORS PRINTED CIRCUIT BOARD

ASSEMBLY, MANIFOLD, REV 0

B.O.M. #	REV	NOTES	QTY	PART NUMBER	DESCRIPTION
800-0750-02	0		0	800-0750-02	MASTER BILL OF MATERIALS
704-0750-01	0		1	010-0016-00	CABLE, RIBBON, 16-COND, 9" LONG
704-0750-01	0		1	016-0004-00	TUBING, SHRINK, 3/16" I.D. X 1" LONG
704-0750-01	0		1	016-0025-00	TUBING, SHRINK, 1/2" I.D. X 1 1/2" LONG
704-0750-01	0		1	027-0009-00	BUZZER, PIEZO
704-0750-01	0		1	033-0005-00	MANIFOLD, SOLENOID/REGULATOR W/BKT
704-0750-01	0		1	089-0016-00	JACK, PMF, 3-COND, DOUBLE CLOSED CIRCUIT
704-0750-01	0		1	100-0001-00	SOCKET, CONNECTOR, 16-PIN
704-0750-01	0		ASR@312	0021-00	TEFLON TAPE
704-0750-01	0		1	404-0750-71	BRACKET, ANTI-TURN
704-0750-01	0		1	480-0141-00	NIPPLE, HEX, CHROME, 1/8" NPTM TO 9/16-18 X .912
704-0750-01	0		1	480-0142-00	NIPPLE, HEX, CHROME, 1/8" NPTM TO 9/16-18 X 1.187
704-0750-01	0	*	1	480-0144-00	HOSE BARB, 3/16" I.D. (DEMAND VALVE UNITS ONLY)
704-0750-01	0		1	490-0016-00	VALVE, NUT
704-0750-01	0		1	700-0750-01	JUMPER, BLACK, 2 1/2" LONG
704-0750-01	0		1	700-0750-06	JUMPER, RED, 2 1/2" LONG
704-0750-01	0		1	700-0750-15	JUMPER, BLACK, 7" LONG
704-0750-01	0		1	700-0750-16	JUMPER, GRAY, 7" LONG
704-0750-01	0		1	700-0750-17	JUMPER, YELLOW, 7" LONG
704-0750-01	0		1	700-0750-18	JUMPER, WHITE, 7" LONG
704-0750-01	0		1	700-0750-19	JUMPER, GREEN, 7" LONG
704-0750-01	0		1	704-0750-06	ASSEMBLY, VALVE, FLOW CONTROL

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ASSEMBLY, BATTERY PACK - 4AH, REV 0

B.O.M. #	REV	NOTES	QTY	PART NUMBER	DESCRIPTION
800-0750-02	0		0	800-0750-02	MASTER BILL OF MATERIALS
704-0750-03	0		1	016-0029-00	TUBING, SHRINK
704-0750-03	0		2	021-0016-00	BATTERY, LEAD ACID, 6VDC, 4AH
704-0750-03	0		1	099-0009-02	PLUG, CMM/F, 2-COND AUTOMOTIVE
704-0750-03	0		1	310-0016-00	INSULATOR, BATTERY, 4AH
704-0750-03	0		ASRQ600	0003-00	GLUE, HOT MELT
704-0750-03	0		1	700-0750-11	JUMPER, #18 AWG, ORANGE, 3" LONG

ASSEMBLY, PATIENT VALVE, REV 0

B.O.M. #	REV	NOTES	QTY	PART NUMBER	DESCRIPTION
800-0750-02	0		0	800-0750-02	MASTER BILL OF MATERIALS
704-0750-04	0	*	1	416-0020-00	CAP, VINYL (NON-DEMAND VALVE UNITS ONLY)
704-0750-04	0		2	490-0005-00	VALVE, LEAF
704-0750-04	0		1	490-0006-00	VALVE, DIAPHRAGM
704-0750-04	0		1	490-0014-00	VALVE, LEAF
704-0750-04	0		1	490-0020-00	HOUSING, PATIENT VALVE
704-0750-04	0		1	490-0021-00	EXHALATION CAP, OUTER, PATIENT VALVE
704-0750-04	0		1	490-0022-00	EXHALATION CAP, INNER, PATIENT VALVE
704-0750-04	0		1	490-0023-00	COLLAR, THREADED, PATIENT VALVE
704-0750-04	0		1	490-0024-00	BAFFLE, PATIENT VALVE
704-0750-04	0		1	490-0025-00	ELBOW, GAS INLET, PATIENT VALVE
704-0750-04	0		1	490-0026-00	ELBOW, PATIENT CONNECTION, PATIENT VALVE
704-0750-04	0		1	490-0027-11	REDUCER, 15MM MALE TO 10MM MALE

ASSEMBLY, AC POWER SUPPLY, REV 0

B.O.M. #	REV	NOTES	QTY	PART NUMBER	DESCRIPTION
800-0750-02	0		0	800-0750-02	MASTER BILL OF MATERIALS
704-0750-05	0	*	1	002-0001-00	CABLE, 75" LONG, 18AWG, 2-COND (TYPE II)
704-0750-05	0		4	016-0004-00	TUBING, SHRINK, 3/16" I.D. X 1" LONG
704-0750-05	0		1	081-0011-00	FUSE, MIDGET, 3A, 125V
704-0750-05	0	*	7	092-0007-00	TERMINAL, CRIMP (TYPE II)
704-0750-05	0		1	100-0005-00	CONNECTOR, 7-PIN
704-0750-05	0		1	117-0013-00	SWITCH, ROTARY, VOLTAGE SELECT
704-0750-05	0		2	312-0019-00	TAPE, P/S, FOAM, 1/2" X 1" X 1/8" THK
704-0750-05	0		1	325-0750-04	LABEL, P/S, SERIAL NUMBER, CHARGER MODULE
704-0750-05	0		1	334-0034-00	FUSEHOLDER, INLINE, WITH LEADS
704-0750-05	0		1	340-0030-00	BUSHING, NYLON, STRAIN RELIEF
704-0750-05	0	*	2	340-0031-00	BUSHING, STRAIN RELIEF (TYPE II)
704-0750-05	0		5	346-0440-01	NUT, KEPS, 4-40
704-0750-05	0		5	357-0440-10	SCREW, PHILLIPS, FLAT HEAD, 4-40 X 5/8
704-0750-05	0		4	368-0011-00	SPACER, NYLON, #4 I.D. X .25 O.D. X .25 LONG
704-0750-05	0		1	374-0017-00	TERMINIAL, FI, RING, FOR #6 STUD, 16-14AWG
704-0750-05	0		1	402-0750-02	CASE, AC POWER SUPPLY
704-0750-05	0		1	404-0001-00	BRACKET, TRANSFORMER MOUNTING
704-0750-05	0		ASR	606-0001-00	SILICONE GREASE
704-0750-05	0		1	700-0750-10	JUMPER, BLACK, 6" LONG
704-0750-05	0		1	700-0750-12	JUMPER, RED, 6" LONG
704-0750-05	0		1	702-0750-05	ASSEMBLY, AC POWER SUPPLY PRINTED CIRCUIT BOARD
704-0750-05	0		1	708-0004-00	LINE CORD, MOLDED, W/HOSP GRADE PLUG, 18/3
704-0750-05	0		1	708-0750-01	CABLE, DC PWR PLUG, SHIELDED, 18AWG X 6' LONG

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ASSEMBLY, FLOW CONTROL VALVE, REV 0

B.O.M. #	REV	NOTES	QTY	PART NUMBER	DESCRIPTION
800-0750-02	0		0	800-0750-02	MASTER BILL OF MATERIALS
704-0750-06	0		1	376-0036-00	WASHER, NYLON, SHOULDER, #10 X 3/16
704-0750-06	0		1	376-0037-00	WASHER, NYLON, FLAT, .281 I.D. X .500 O.D. X .030
704-0750-06	0		1	480-0143-00	NIPPLE, HEX, CHROME, 1/8" NPTM TO 10MM X 2.075
704-0750-06	0		1	490-0015-11	VALVE, SPINDLE
704-0750-06	0		1	490-0018-11	VALVE, SWIVEL
704-0750-06	0		1	490-0019-11	VALVE, BODY
704-0750-06	0		1	540-0082-00	TUBE, LATEX, 1/4" I.D. X 7/16" O.D. X 0.80 LONG

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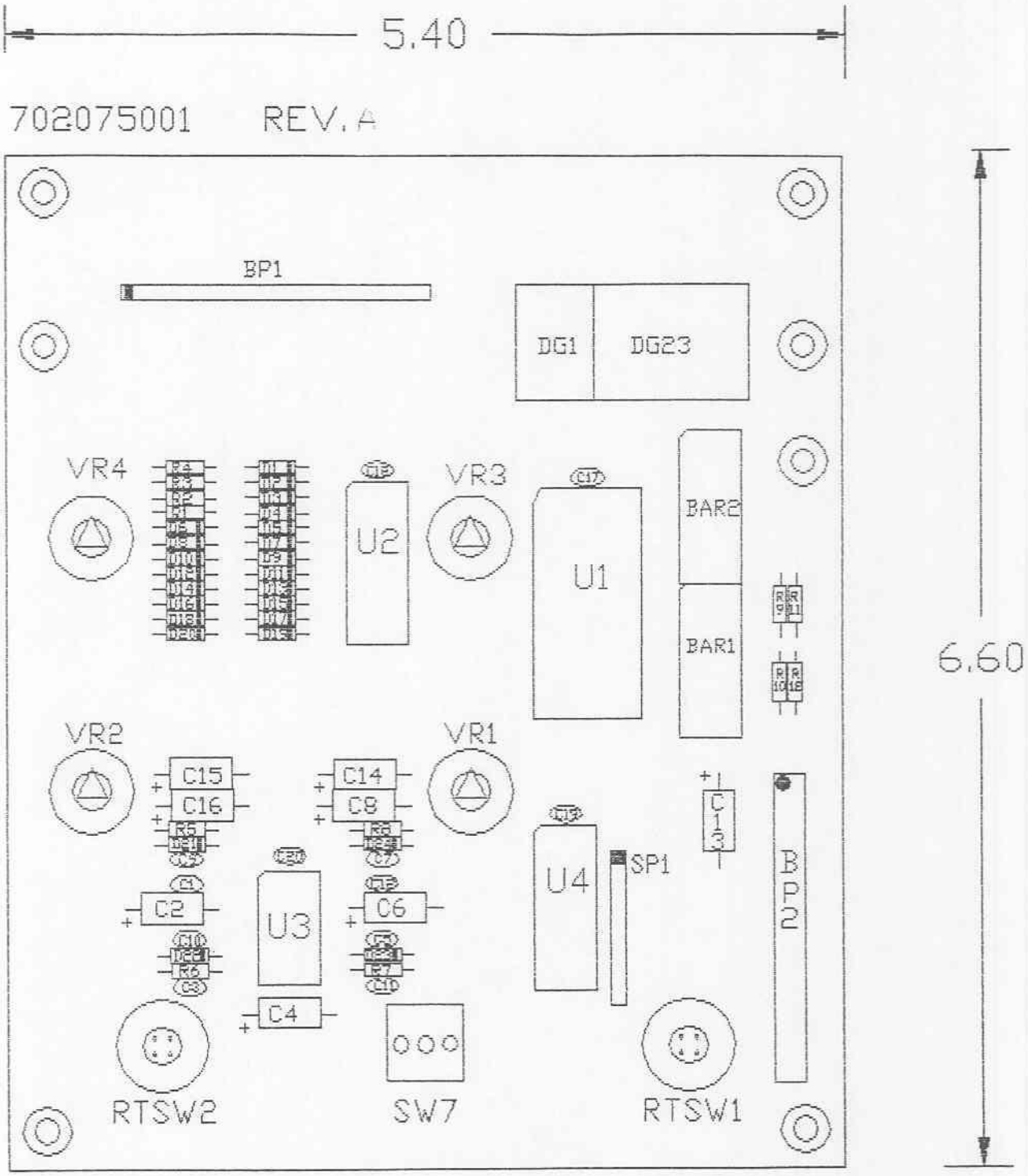
ASSEMBLY, HARNESS, REV 0

B.O.M. #	REV	NOTES	QTY	PART NUMBER	DESCRIPTION
800-0750-02	0		0	800-0750-02	MASTER BILL OF MATERIALS
704-0750-10	0		3	016-0004-00	TUBING, SHRINK, 3/16" I.D. X 1" LONG
704-0750-10	0		1	016-0025-00	TUBING, SHRINK, 1/2" I.D. X 1 1/2" LONG
704-0750-10	0		1	031-0002-00	FERRITE
704-0750-10	0		1	089-0011-00	CONNECTOR, PMF, 5-PIN, POWER
704-0750-10	0		5	092-0006-00	TERMINAL, CRIMP
704-0750-10	0		1	099-0010-02	PLUG, CMM/F, 2-COND
704-0750-10	0		1	100-0002-00	CONNECTOR, 5-PIN
704-0750-10	0		3	305-0001-00	CABLE TIE, MINIATURE
704-0750-10	0		1	700-0750-02	JUMPER, BLACK, 1 1/2" LONG
704-0750-10	0		1	700-0750-03	JUMPER, BLACK, 6 1/2" LONG
704-0750-10	0		1	700-0750-04	JUMPER, BLACK, 7 1/2" LONG
704-0750-10	0		1	700-0750-05	JUMPER, BROWN, 9" LONG
704-0750-10	0		1	700-0750-07	JUMPER, RED, 9" LONG
704-0750-10	0		1	700-0750-08	JUMPER, RED, 9" LONG
704-0750-10	0		1	700-0750-09	JUMPER, VIOLET, 9" LONG

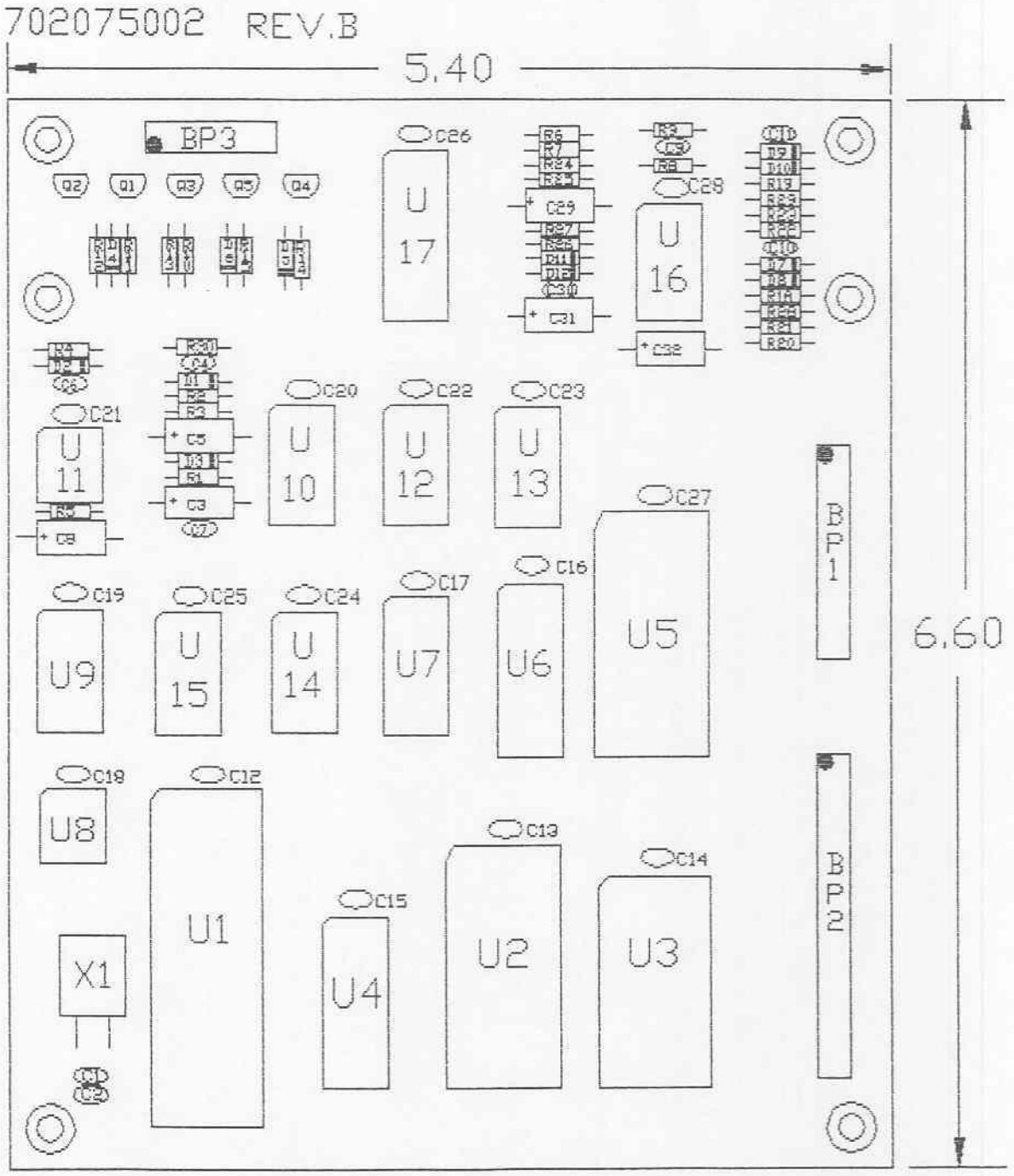
270

ACCESSORY KIT, REUSABLE HOSES W/DEMAND, 750M, REV 0

B.O.M. #	REV	NOTES	QTY	PART NUMBER	DESCRIPTION
800-0750-02	0		0	800-0750-02	MASTER BILL OF MATERIALS
802-0750-10	0		5	334-0032-00	HOLDER, VENTILATOR HOSES
802-0750-10	0		1	402-0005-00	CASE, BLACK
802-0750-10	0		1	540-0073-00	HOSE, 72" LONG, 1/8" I.D. X 3/16" O.D.
802-0750-10	0		1	540-0075-00	HOSE, 72" LONG, 3/16" I.D. X 5/16" O.D.
802-0750-10	0		1	540-0076-00	HOSE, 72" LONG, 10MM I.D. W/SILICONE CUFFS
802-0750-10	0		1	580-0750-01	PACKING, FOAM INSERT (USE W/402-0005-00)
802-0750-10	0		1	704-0750-04	ASSEMBLY, PATIENT VALVE
802-0750-10	0		1	704-0750-05	ASSEMBLY, AC POWER SUPPLY
802-0750-10	0		1	708-0001-00	DC CHARGER/POWER CABLE
802-0750-10	0		1	812-0004-00	MASK, VENTILATOR, ADULT/CHILD
802-0750-10	0		1	820-0048-00	ASSEMBLY, DISPOSABLE PEEP VALVE
802-0750-10	0		1	820-0049-00	AIRWAY, GUEDAL, TRANSLUCENT, 80MM
802-0750-10	0		1	820-0050-00	AIRWAY, GUEDAL, TRANSLUCENT, 100MM
802-0750-10	0		1	825-0006-00	ASSEMBLY, OXYGEN HOSE, 6' LONG
802-0750-10	0		2	906-0750-04	MANUAL, OPERATION/SERVICE

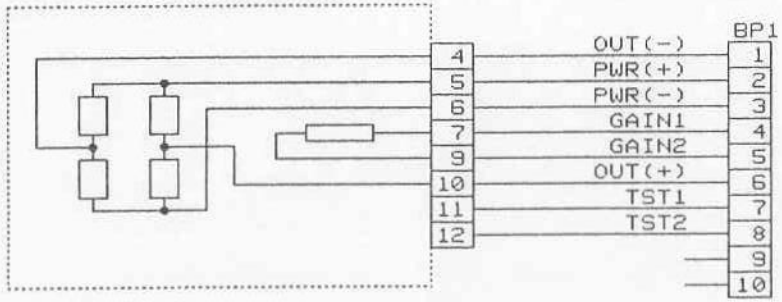


ASSEMBLY, DISPLAY PRINTED CIRCUIT BOARD

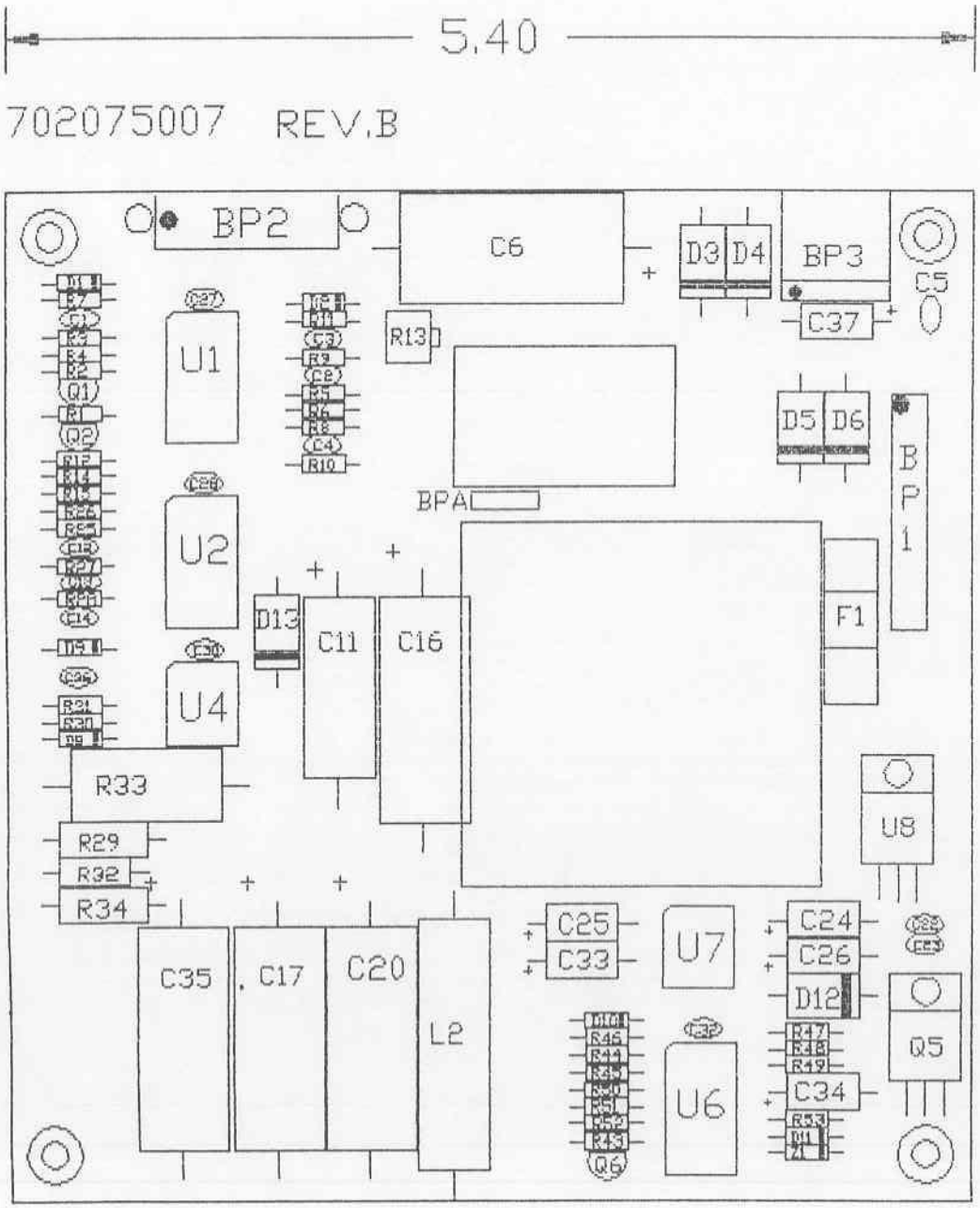


ASSEMBLY, CPU PRINTED
CIRCUIT BOARD

REVISIONS			
REV NO.	CHANGE LEV.	DATE	APPR.
00	PCB	9/2/88	



		IMPACT W.CALDWELL,NJ	
		VENTILATOR TRANSDUCER BD.	
APPROVAL	DATE		
DRAWN PF	8/24/88		
		SCALE	A DRAWING NO. 240-0750-04-4
			SHEET 4 OF 4

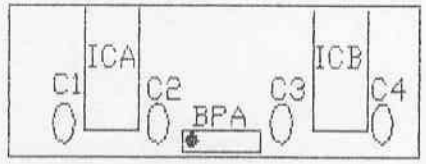


5.60

ASSEMBLY, ANALOG/POWER PRINTED CIRCUIT BOARD

ASSEMBLY, LINEAR/ REGULATOR PRINTED CIRCUIT BOARD

702075006



0.80

2.15